

Pomegranate (*Punica granatum*)-Overview

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ABSTRACT

Pomegranate (*Punica granatum*) is most important plant belonging to family Lythraceae. A symbol of fecundity and divine femininity emerges, whose fruit rinds, bark and roots are used worldwide as taenicides, owing to alkaloids, and treatment of diarrhea and oral and genital lesions, owing to tannins and astringency. The seeds contain oil which contains not only the steroidal estrogen, estrone, in the highest concentration found in any botanical species, but also a full range of non-steroidal phytoestrogens including the comesten, coumestrol, and the isoflavones, genistein and daidzein. Both the juice and the oil contain numerous and diverse bioflavonoid, which have been shown to be both potently antioxidant and inhibitory of one or both of the enzymes cyclooxygenase (catalyzing arachidonic acid to prostaglandins) and lipoxygenase (catalyzing arachidonic acid to leukotrienes). Extracts of the rinds have been shown to be bactericidal, antiviral, antitumor and use of pomegranates in the treatment of Acquired Immune Deficiency Syndrome (AIDS) owing to their antioxidant properties and botanical uniqueness. This present study is designed to evaluate the phytochemical and pharmacological profile of different extract of *Punica granatum*.

Keywords: Pomegranate, phytoestrogens, cultivation, pharmacological profile.

INTRODUCTION

Pomegranate is native plant of Northern Africa and the Caucasian. Mountains are widely distributed throughout the Southern United State. The name Pomegranate comes from the Latin Pomumll meaning apple and —granatusll meaning full of seeds. The botanical name is derived from old French; Pomegrenate- Pomegranate apple. It belongs to family Lythraceae.

SYNONYMS

Hindi : Anar, **Sanskrit :** Dadimah, **English :** Pomegranate, **Marathi :** Dalimba, **Gujarati :** Dalimba, **Bengali :** Dadim, **Tamil :** Madalai, **Telgu :** Danimma, **Malayalam :** Talimatatalum, **Pharsi :** Anar tursa, **Arabi :** Roman Hamiz, **German :** Granatapfels.

BOTANICAL CLASSIFICATION

Botanical name- *Punica granatum*
Kingdom: Plantae (Angiosperms)
Order: Myrtales
Family: Lythraceae
Genus: Punica
Species: *P. granatum*

CULTIVATION

Soils: The pomegranate does best in well-drained ordinary soil, but also thrives on calcareous or acidic loam as well as rock strewn gravel.

Climate- Pomegranates prefer a semi-arid mild-temperate to subtropical climate and are naturally adapted to regions with cool winters and hot summers. A humid climate adversely affects the formation of fruit. The tree can be severely injured by temperatures below 12° F.

Irrigation: Once established, pomegranates can take considerable drought, but for good fruit production they must be irrigated. To establish new plants they should be watered every 2 to 4 weeks during the dry season. The plants are tolerant of moderately saline water and soil conditions.

Fertilization: Generally the trees are given 2 to 4-ounce applications of ammonium sulfate or other nitrogen fertilizer the first two springs. After that very little fertilizer is

needed, although the plants respond to an annual mulch of rotted manure or other compost.

Pruning: Plants should be cut back when they are about 2 ft. high. From this point allow 4 or 5 shoots to develop, which should be evenly distributed around the stem to keep the plant well balanced. For the first 3 years the branches are judiciously shortened annually to encourage the maximum number of new shoots on all sides, prevent straggly development and achieve a strong well framed plant. After the 3rd year, only suckers and dead branches are removed. 13

Propagation: The pomegranate can be raised from seed but may not come true. Cuttings root easily and plants from them bear fruit after about 3 years. Twelve to 20 inches long cuttings should be taken in winter from mature, one-year old wood. The leaves should be removed and the cuttings treated with rooting hormone and inserted about two-thirds their length into the soil or into some other warm rooting medium. Plants can also be air-layered but grafting is seldom successful.

Pests and Diseases: Pomegranates are relatively free of most pests and diseases. Minor problems are leaf and fruit spot and foliar damage by white flies, thrips, mealybugs and scale insects.

Harvest: The fruits are ripe when they have developed a distinctive color and make a metallic sound when tapped. The fruits must be picked before over maturity when they tend to crack open, particularly when rained on. The pomegranate is equal to the apple in having a long storage life. It is best maintained at a temperature of 32° to 41° F. and can be kept for a period of 7 months within this temperature range and at 80 to 85% relative humidity without shrinking or spoiling. The fruits improve in storage, becoming juicier and more flavorful.

DESCRIPTION

Macroscopy

Tree

The pomegranate is a neat, rounded shrub or small tree that can grow to 20 or 30 ft., but more typically to 12 to 16 ft. in height. It is usually deciduous, but in certain areas the leaves will persist on the tree. The trunk is covered by a red-brown bark which later becomes gray. The branches are stiff, angular and often spiny. There is a strong tendency to sucker from the base. Pomegranates are also long-lived. The vigor of a pomegranate declines after about 15 years.

Leaves

The pomegranate has glossy, leathery leaves that are narrow and lance-shaped.

Flowers

The attractive scarlet, white or variegated flowers are over an inch across and have 5 to 8 crumpled petals and a red, fleshy, tubular calyx which persists on the fruit. The flowers may be solitary or grouped in twos and threes at the ends of the branches. The pomegranate is self-pollinated as well as cross-pollinated by insects. Cross-pollination increases the fruit set. Wind pollination is insignificant

Fruit

The nearly round, 2-1/2 to 5 in. wide fruit is crowned at the base by the prominent calyx. The tough, leathery skin or rind is typically yellow overlaid with light or deep pink or rich red. The interior is separated by membranous walls and white, spongy, bitter tissue into compartments packed with sacs filled with sweetly acid, juicy, red, pink or whitish pulp or aril. In each sac there is one angular, soft or hard seed. High temperatures are essential during the fruiting period to get the best flavor. The 15 Pomegranate may begin to bear in 1 year after planting out, but 2-1/2 to 3 years is more common. Under suitable conditions the fruit should mature some 5 to 7 months after bloom.

CHEMICAL CONSTITUENTS

Pomegranate is composed of a rich variety of flavonoids, which comprise approximately 0.2% to 1.0% of the fruit. Approximately 30% of all anthocyanidins found in pomegranate are contained within the peel. The isoflavones genistein, diadzein, genistin, and diadzin as well as estrone, the metabolic derivative of estradiol, have been isolated from the seeds. The stems and roots of pomegranate contain alkaloids including isopelletierine, pseudopelletierine, and N-methylisopelletierine, Anthocyanidins Pelargonidin, ellagotannins, Gallic acid and Ellagic acid,

PHARMACOLOGICAL PROFILE TRADITIONAL USE

The pomegranate tree was said to have flourished in the Garden of Eden and has been used extensively in the folk medicine of many cultures. The juicy pomegranate fruit with its multitudinous seeds was a popular symbol of fertility and fecundity in ancient times and it is counted among the seven kinds of produce with which the land is blessed. Doctors in Greece prescribed pomegranate juice as a remedy for inflammation, intestinal worms, persistent coughs, diarrhea, and dysentery. The Babylonians regarded pomegranate seeds as an agent of resurrection. Persians believed that the seeds conferred strength and invincibility on the battlefield, and in ancient China, the seeds were revered for their powers to promote longevity and immortality. People of the Georgian Republic in Russia used pomegranate for arresting chronic mucous discharges, passive hemorrhages, night sweats and diarrhea. It has also been prescribed to

strengthen the human capillary system and prevent atherosclerosis, asthma, tonsillitis and bronchitis.

THERAPEUTIC USE

The pomegranate has been used in natural and holistic medicine to treat sore throats, coughs, urinary infections, digestive disorders, skin disorders, arthritis and to expel tapeworms. However, modern research suggests that pomegranates might to be useful in treating such serious conditions as prostate cancer, skin cancer, osteoarthritis and diabetes. Studies also show that pomegranate seeds might help rid the digestive system of fats. Clinical research shows that pomegranates, when part of a healthy diet, might help prevent heart disease, heart attacks and strokes. This is because pomegranates have the potential to thin the blood, increase blood flow to the heart, reduce blood pressure, reduce plaque in the arteries, and reduce bad cholesterol while increasing good cholesterol. Pomegranate flowers have been used in both the Unani and Ayurvedic systems of medicines as a remedy for diabetes. Pomegranate extracts have been shown to scavenge free radicals and decrease macrophage oxidative stress and lipid peroxidation in animals and increase plasma antioxidant capacity in elderly humans. A small clinical trial demonstrated inhibits serum ACE and reduces systole blood pressure in hypertensive patients. Topical applications of pomegranate preparation have been found to be particularly effective for controlling oral inflammation, as well as bacterial and fungal counts in periodontal disease and candida associated denture stomatitis.



Pomegranate fruit and flowering plant

REFERENCES

1. The wealth of India first supplement series (Raw material) vol. 1
2. Sexena A, Vikram N.K. Role of selected Indian plants in management of type 2 diabetes; a review, *J Altern complement med* 2004.
3. World Health Organization, Geneva; Quality Control Method for Medicinal Plant Materials, A.I.T.B.S. Publisher and Distributors., New Delhi, 2002;8-24.
4. Pomegranate. California Rare Fruit Growers LaRue, James H. (1980). "Growing Pomegranates in California". California Agriculture and Natural Resources. Retrieved 2007-10-25.
5. Leighton, Ann (1986). American gardens in the eighteenth century: "for use or for delight". Amherst: University of Massachusetts Press. pp. 242.
6. Kim ND, Mehta R, Yu W, Neeman I, Livney T, Amichay A, et al. Chemopreventive and adjuvant therapeutic potential of pomegranate (*Punica granatum*) for human breast cancer. *Breast Cancer Res Treat.* 2002 Feb; 71(3):203-17.
7. Prakash, V., Singhal, K.C. and Gupta, R.R. (1980). Anthelmintic activity of *Punica granatum* and *Artemisia siversiana*. *Indian J. pharmacol.* 12:61A-80A.
8. Sharaf, A. and Nigm, S.A.R. (1964). The oestrogenic activity of pomegranate seed oil. *J. Endocrinol.* 29:91-92.
9. Shubert, Y.S., Lansky, E.P. and Neeman, I. Antioxidant and eicosanoid enzyme inhibition properties of pomegranate seed oil and fermented juice flavonoids. *J. Ethnopharmacol.* (in press).
10. Prakash Ved. Mehrotra B.N, 1887, Anthelmintic plants in Traditional Remedies in India, *Ijhos*, 22; 332-340.
11. Andress, Elizabeth L. And Judy A. Harrison. 1999. So easy to preserve, 4th ed. Cooperative Extension Services, University of Georgia, Athens G.A.
12. Nawwar, M. A. M.; Hussein, S. A. M.; Merfort, I. Leaf phenolics of *Punica granatum*. *Phytochemistry* 1994a, 37, 1175-1177.
13. Lansky, E.; Shubert, S.; Neeman, I. Pharmacological and therapeutical properties of pomegranate. In Proceedings 1st International Symposium on Pomegranate; Megarejo, P.; Martínez, J. J.;

- Martínez, J., Eds.; CIHEAM, Orihuela, Spain, 1998; Pr-07.
14. Du, C. T.; Wang, P. L.; Francis, F. J. Anthocyanin's of pomegranate, *Punica granatum*. *J. Food Sci.* 1975, 40, 417-418.
 15. Yao, M.; Lam, E. C.; Kelly, C. R.; Zhou, W.; Wolfe, M. M. Cyclooxygenase-2 selective inhibition with NS-398 suppresses proliferation and invasiveness and delays liver metastasis in colorectal cancer. *Br. J. Cancer* 2004, 90 (3), 712-9.
 16. Albrecht, M.; Jiang, W.; Kumi-Diaka, J.; Lansky, E. P.; Gommersall, L. M.; Patel, A.; Mansel, R. E.; Neeman, I.; Geldof, A. A.; Campbell, M. J. Pomegranate extracts potently suppress proliferation, xenograft growth, and invasion of human prostate cancer cells. *J. Med. Food* 2004, 7 (3), 274-83.
 17. Seeram, N. P.; Adams, L. S.; Henning, S. M.; Niu, Y.; Zhang, Y.; Nair, M. G.; Heber, D. In vitro antiproliferative, apoptotic and antioxidant activities of punicalagin, ellagic acid and a total pomegranate tannin extract are enhanced in combination with other polyphenols as found in pomegranate juice. *J. Nutr. Biochem.* 2005, 16 (6), 360-7.
 18. Aviram, M.; Rosenblatt, M.; Gaitani, D.; Nitecki, S.; Hoffman, A.; Dornfield, L.; Volkova, N.; Presser, D.; Attias, J.; Liker, H.; et al. Pomegranate juice consumption for 3 years by patients with carotid artery stenosis (CAS) reduces common carotid intima-media thickness (IMT), blood pressure and LDL oxidation. *Clin. Nutr.* 2004, 23, 423-33.
 19. Seeram, N. P.; Lee, R.; Hardy, M. L.; Heber, D. Large-scale purification of ellagotannins from pomegranate husk, a byproduct of the commercial juice industry. *Sep. Purif. Technol.* 2005, 41, 49-55.
 20. Ajaikumar K.B, Asheef, M, Babu BH and Padikkala J. The inhibition of gastric mucosal injury by *Punica granatum* L. (pomegranate) methanolic extract. *Journal of Ethnopharmacol.* 96: 171-176, 2005.
 21. Ahmed MM and Zaki NI. Assessment the ameliorative effect of pomegranate and rutin on chlorpyrifos-ethyl-induced oxidative stress in rats. *Nature and Science.* 7(10): 49-61, 2009.
 22. Murthy KN, Jayaprakasha GK and Singh RP. Studies on antioxidant activities of pomegranate peel extract using in vivo models. *J Agri Food Chem.* 50: 4791-4795, 2002.
 23. Nasr CB, Ayed N and Metche M. Quantitative determination of polyphenolic content of pomegranate peel. *Zeitschrzfi fur lebensmittel untersuchung und forschung.* 203: 374-378, 1996.