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The genus *Pyrus*: An update

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Abstract
Genus *Pyrus* is classified into three main categories according to their origin and production. These are Japanese pear *(Pyrus pyrifolia*), Chinese pear *(Pyrus bretschneideri*; *Pyrus ussuriensis*) and European pear (*Pyrus communis*). This review complies the information about Genus *Pyrus* that includes ethnomedicinal, morphology, phytoconstituents and pharmacological reports. Most popular species of genus *Pyrus* are *P. pyrifolia* and *P. communis. P. communis* is native to Central and Eastern Europe and Southwest Asia while *P. pyrifolia* is native to East Asia. *Pyrus* is rich source of alkaloids, tannins, carbohydrates, amino acids, steroids, cardiac and coumarin glycosides, flavonoids and phenolic compounds. Amongst various species of genus Pyrus, *P. communis* and *P. pyrifolia* proven to have medicinal value, and have been conventionally used as antioxidant and antimicrobials. In the ultimate fraction, the prospect possibility of *Pyrus* species has been accentuate with a outlook to generate their miscellaneous organic behavior and mode of actions.

Keywords: *Pyrus, Pyrus pyrifolia, P. communis,* antioxidant, antimicrobial

Introduction
The review on *Pyrus* has been compiled using references from major sources such as Chemical Abstract, Pub Med, Science Direct, Research Gate, Medicinal and Aromatic Plants Abstracts. The accessible knowledge on *Pyrus* has been alienated into five sections, these are, ethnomedicial properties, morphology, phytoconstituents, pharmacological and clinical studies. Traditional uses, and Alternative and complimentary medicinal uses are the subdivision of ethnomedicine division. Under title 'Alternative and complimentary therapeutic uses' medicine prescribed by medical practitioners for *Pyrus* species or their preparations for the treatment of various ailments are highlights.

The Genus *Pyrus*

Kingdom	Plantae
Divison	Magnoliophyta
Class	Mangnoliopside
Order	Rosales
Family	Rosaceae
Subfamily	Amygdaloideae
Genus	*Pyrus L.*
Species	*pyrifolia, bretschneideri, communis,*

The genus *Pyrus* belonging to Rosaceae family and comprise about five species which are commonly distributed in Europe, Northern Africa, Asia Minor, Iran and Central Asia, Tian-Shan and Hindu Kush mountains eastward to Japan [1]. In India pear is cultivated in Uttarakhand, Himachal Pradesh, Uttar Pradesh, Punjab, Jammu-Kashmir and many other regions [2]. Most popular species of the genus are *P. pyrifolia, P. bretschneideri* and *P. communis* [3].

Ethnopharmocology
Traditional uses
P. pyrifolia has a handful traditional medicinal use. *P. pyrifolia* has been used for years to alleviating alcohol hangover, constipation, diuresis, cough, and flu [4].
P. communis bears many actions like astringent, sedative activity and febrifuge [5]. Flowers of common pear are used as analgesic and spasmolytic [6].

Alternative and complimentary medicinal uses

Fruits of *P. pyrifolia* possess anti gastric ulcer [7], anti-inflammatory and antioxidative effects [8].

Fruits of *P. communis* exhibited anti-diabetic, hypolipidemic [9], antioxidant [10] and antimicrobial activities [11].

Morphology

P. pyrifolia

Leaves: Leaves are ovate, broad cuneate rotund, large and fine serrate-setose [12-13].

Flower: Flower bears corymbose inflorescences, they are white in color and 5cm wide, with terminally mixed buds, appearing before or with the leaves [16].

Fruit: Fruit are medium to very large in size have russet or smooth skin, oblate, globose, ovoid, and oblong in shape, Short to long Peduncle, Calyx is deciduous, 5 or rarely 4 Carpel, Crisp & juicy flesh [14-15].

P. communis

Leaves: Leaves are alternate. 2.5-10 cm long and 3-5 cm wide with shiny green color above and dull from the below side [17].

Flower: Flower bears corymbose inflorescences, they are white in color and 5cm wide, with terminally mixed buds, appearing before or with the leaves. Ovary is 2.5-5 cm long containing 10 ovules. Ovary is arranged epigynously or inferiorly [18].

Fruit: Pear-shaped with determined or deciduous calyx, 4-12 cm long, greenish colored, dry and gritty with juicy texture [19].

Seed: Blackish in colour, 8.4 × 4.8 mm, with a thin layer of endosperm [20].

Phytoconstituents

Phytoconstituents of *P. communis* and *P. pyrifolia* are reported in Table 1

Table 1: Phytoconstituents of *P. communis* and *P. pyrifolia*

Part	Constituents Present in *P. communis*	Constituents Present in *P. pyrifolia*
Leaves	Arbutin, isoquercitrin, sorbitol, ursolic acid, kaempferol 3-O-β-D (6”-O-α-Lrhamnopyranosyl)-glucopyranoside, quercetin 3-O-β-D-(6”-O-α-L-rhamnopyranosyl)-glucopyranoside [21]	Arbutin, kaempferol 3-O-β-D (6”-O-α-Lrhamnopyranosyl) glucopyranoside, quercetin 3-O-β-D-(6”-O-α-L-rhamnopyranosyl)-glucopyranoside [26]
Bark	Friedelin, epifriedelanol and beta-sitosterol [22]	Steroids, Saponins, Fats, Flavonoids, Tannins, Carbohydrates [27]
Root bark	Phloridzin [23]	Phloridzin [23]
Flowers	Chlorogenic acid Fatty acid [24]	Chlorogenic acid, Fatty acid [24]
Stem bark	Triterpenoids [25]	Triterpenoids [25]
Fruit	Arbutin, isoquercitrin, sorbitol, ursolic acid, kaempferol 3-O-β-D (6”-O-αLrhamnopyranosyl)-glucopyranoside, quercetin 3-O-β-D-(6”-O-α-L-rhamnopyranosyl)-Glucopyranoside, Vitamin A, Vitamin C, Vitamin E, Vitamin B12, Vitamin B3, Vitamin B5 [24]	Minerals, Amino acids, Volatiles, Vitamins, Phenolics Including Arbutin, Chlorogenic acid, Hydroxycinnamoyl malate and Flavonoids [28-29]

Pharmacological Studies

It has been reported that *P. communis* (ethanolic and ethyl acetate extract) at a dose of 200mg/kg and glibenclamide (5mg/kg) showed the anti-diabetic and hypolipidemic activities [9]. Methanolic extract of the *P. communis* fruit is reported to exhibit the antioxidant activity [10]. Fresh juice and aqueous extract of pear showed antimicrobial activity against *Staphylococcus* and *Escherichia coli* [11]. Pear contains Arbutin which has potential to lower the level of melanin in the body and act as natural whitening agent [6]. Pear is rich source of vitamin C. Vitamin C stimulates the production of collagen fibers in the skin and heals the wounds. Arbutin reduce the risk of wound infection. The wound healing activity of ethyl acetate and ethanol extracts of fruits of *P. communis* (EAEPC and EEPC 200 mg/kg) was investigated by various wound healing models in normal rats such as excision, incision and dead space wound model [30].

Fruit peel extracts of *P. pyrifolia* is reported to exhibit the antioxidant activity [31] Ethyl acetate extract of exhibited the strongest anti-inflammatory effect which was evaluated by using the ear edema model [7].

Clinical Studies

Pear is a rich source of dietary flavonoid and stilbene. Regular utilization of pear effect the level of plasma lipids and total antioxidant capacity of plasma. Subjects were given the fruits and juice daily, after 26 days of consumption total antioxidant capacity and lipid profile were measured. Fruit consumption increased total plasma antioxidant capacity (TAC), total cholesterol, high-density lipoprotein cholesterol, and low-density lipoprotein cholesterol [32]. Flavonoid and stilbene rich fruits consumption reduces the risk of cardiovascular diseases [25]. Effect of fruit on energy consumption and body weight was evaluated by adding to the diet in women. Women with body mass index larger than 25 kg/m^2 were erratically selected and 3 pears are add to their usual diet for 10 weeks. After10 weeks their body mass index are measured and it was found to less than 25 kg/m^2. Regular utilization of pears is also reported to weight reduction [33].

Conclusion

Pear is good source of vitamin C, dietary fibers, fructose and sorbitol. Pears improve gut health and prevent constipation when consumed with combination of dietary fiber. Amongst the three species of *Pyrus* two species are investigated. Pharmacological studies states that *P. pyrifoli*a exhibit antioxidant, antimicrobial and analgesic properties; *P. communis* exhibit antioxidant, antimicrobial, anti-inflammatory, skin whiting and analgesic properties. Therefore it is to concluded that plants of this genus hold great potential to treat the chronic diseases, the thorough investigations may be carried out by the researchers to explore their various activities.

References

1. Layne REC, Quamme HA. Pears. Advances in fruit breeding. Janick J and Moore JN (Eds.). Purdue University Press, West Lafayette, Indiana, 1975, 38-70.
2. Lee SH. A taxonomical survey of the oriental pears. Proceedings of the American Society for Horticultural Science. 1948; 51:152-156.
3. Li X, Wang T, Zhou B, Gao W, Cao J, Huang L. Chemical composition and antioxidant or anti-inflammatory potential of peels and flesh from 10 different pear varieties (*Pyrus* spp.). Food Chemistry. 2014; 152:531-538.
4. Lee SH, Isse T, Kawamoto T, Woo HS, Kim AK, Park JY *et al*. Phyto therapy Research. 2012; 26(11):1753-1758.
5. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal plants. Drug research laboratory, Jammua-Kashmir, 2006, 206.
6. Rychilnska I, Gudej J. Qualitative and quantitative chromatographic investigation of hydroquinone derivatives in *P. communis* L. Acta polonica Pharmaceutica Drug Research. 2003; 60:309-312.
7. Huang LJ, Gao WY, Li X, Zhao WS, Huang LQ, Liu CX. Evaluation of the *in vivo* Anti-inflammatory Effects of Extracts from *Pyrus bretschneideri* Rehd. Journal of Agricultural and Food Chemistry. 2010; 58:8983-8987.
8. Li X, Zhang JY, Gao WY, Wang Y, Wang HY, Cao JG, Huang LQ. Chemical composition and anti-inflammatory and antioxidant activities of eight pear cultivars. Journal of Agricultural and Food Chemistry. 2010; 60:8737-8744.
9. Velmurugan C, Bhargava A. Anti-diabetic and hypolipidemic activity of Fruit of *Pyrus communis* L in hypoglycacemic rats. Asian Journal of Pharmaceutical Clinical Research. 2013; 6:108-111.
10. Sharma K, Pasricha V, Satpathy G, Gupta RK. Evaluation of phytochemical and antioxidant activity of raw *Pyrus communis* (L). An underexploited fruit. Journal of Pharmacognosy and Phytochemistry. 2015; 3(5):46-50.
11. Guven K, Yucel E, Centintas F. Antimicrobial activities of fruits of *Crataegus* and *Pyrus* species. Pharmaceutical Biology. 2006; 44:79-83.
12. Pu F, Wang Y. Pomology of China. Pears (in Chinese). Shanghai Science and Technology. Press, Shanghai, China. 1963, 3.
13. Wang Y. Chinese pears. China Agricultural Science, Press, Beijing, 1996.
14. Yu T. Taxonomy of the fruit tree in China (in Chinese). China Agricultural Science, Press, Beijing, 1979.
15. Kajiura I, Suzuki S. Variations in fruit shapes of Japanese pear cultivars (*Pyrus serotina* Rehder var. *culta* Rehder); Geographic differentiation and changes. Japanese Journal of Breeding. 1980; 30:309-328.
16. Kaur R, Arya V. Ethanomedicinal and phytochemical perspectives of *Pyrus communis* (L). Journal of Pharmacognosy and Phytochemistry. 2012; 1:14-19.
17. Bell RL. Pears (Pyrus). In: Moore JN, Ballington JR Jr, eds. Genetic resources of temperate fruit and nut crops. Wageningen, the Netherlands: International Society of Horticulture Sciences, 1991, 657-697.
18. Beyl CA. Fire blight susceptibility in a young Asian pear planting. In: J Janick and J.E. Simon (eds.), Advances in new crops. Timber Press, Portland, 1990; 376.
19. Hartmann HT, Kester DE, Davies F. Plant propagation: principles and practices, NJ Prentice Hall, 5th ed. Englewood Cliffs, 1990; 662.
20. Gill JD, Pogge FL. Pyrus, Pear. In: Seeds of woody plants in the United States. Agriculture Handbook 450. Washington, DC: USDA Forest Service. 1974, 584-586.
21. Gudej J, Rychilnsk I. Chemical compound in *Pyrus communis* L. Flowers. Acta polonica Pharmaceutica Drug Research. 1999; 56:237-239.
22. Rychilnska I, Gudej J. Qualitative and quantitative chromatographic investigation of hydroquinone derivatives in *P. communis* L. Acta polonica Pharmaceutica Drug Research. 2013; 60:309-312.
23. Nortje BK, Koeppen BH. The flavonol glycosides in the fruit of *Pyrus communis* L. cultivar bon chretien. Biochemistry Journal, 1967; 97:209-213.
24. Razavi SM, Zahri S, Zarrini G, Nazemiyeh H, Mohammadi S. Biological activity of querceitin -3-O-glycoside, a known plant flavonoid. Russian Journal of Bioorganic chemistry. 2009; 35(3):414-416.
25. Li G, Zhu Y, Zhang Y, Lang J, Chen Y, Ling W. Estimated daily flavonoid and stilbene intake from fruits, vegetables, and nuts and associations with lipid profiles in Chinese adults. Journal of the Academy of Nutrition and Dietetics. 2013; 113:786-794.
26. Lee BD, Eun JB. Optimum extraction conditions for Arbutin from Asian pear peel by supercritical fluid extraction (SFE) using Box-Behnken design. Journal of Medicinal Plants and Research. 2012; 6:2348-2364.
27. Arya V, Gupta R, Gupta VK. Pharmacognostic and phytochemical investigations on Pyrus pashia Buch.-Ham. Ex D. Don stem bark. Journal of Chemical and Pharmaceutical Research. 2011; 3(3):447-456.
28. Lin LZ, Harnly JM. Phenolic compounds and chromatographic profiles of pear skins (*Pyrus* spp.). Journal of Agricultural and Food Chemistry. 2008; 56:9094-9101.
29. Chinnasamy V, Bhargav A. Wound healing activity of various extracts of fruit of *Pyrus Communis* L. Journal of Pharma Science Innovation. 2014; 3(2):148-152.
30. Cui T, Nakamura K, Ma L, Li JZ, Kayahara H. Analyses of Arbutin and chlorogenic acid, the major phenolic constituents in oriental pear. Journal of Agricultural and Food Chemistry. 2005; 53:3882-3887.
31. Dwivedi P, Prakash P. Evaluation of antioxidant activity of *Pyrus pyrifolia* fruit peel extracts using different extraction methods. Chemical Science Transactions. 2014; 3(4):1511-1515.
32. Alvarez-Parrilla E, De La Rose LA, Legarreta P, Saenz L, Rodrigo-Garcia J, Gonzalez-Aguilar GA. Daily consumption of apple, pear and orange juice differently affects plasma lipids and antioxidant capacity of smoking and non-smoking adults. International Journal of Food Sciences and Nutracetuical. 2010; 61:369-380.
33. Conceicao de Oliveria M, Sichieri R, Mozzer RV. A low energy dense diet adding fruit reduces weight and energy intake in women. Appetite. 2008; 51:291-295.