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Review Article

A Review: Characteristics and Phytochemistry of Sweet Cherry (*Prunus Avium L.*)

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ABSTRACT

Medicinal plants have been used for centuries as essential part of folk medicine. In that Sweet cherry (*Prunus avium L.*) is one of the fruits which is widely used around the worlds as a medicinal source. It is the great sources of several active substances like carotenoids, serotonin, melatonin, phenolic compounds and nutritive compound like sugars & organic Acids (1). Phenolic acids, flavonoids denominated as a secondary metabolite, which shows several health benefits included in the human diet particularly Anti-microbial, Anti-oxidant, Anti- inflammatory, Anti-diabetic, Anti-cardiovascular effect (2). Consumers demand for sweet cherry has increased due to its sweet taste, attractive colour and due to high in anti-oxidant property.

INTRODUCTION

Wild cherry (*prunus avium L.*) is one of the main hardwood species investigated in Europe since the beginning of the 1980s. Wild cherry wood is highly sought after for aesthetic applications such as paneling and cabinet-making, compared to tropical woods or other valuable European broadleaved species like walnut. In addition, the economic value is second only to walnut in the panorama of valuable European timbers (3). Sweet cherry, a fleshy non-climacteric stone fruit belongs to the genus *Prunus* and is mainly grown in countries falling in temperate climates. It is one of

the most widely appreciated fruit for its taste, sweetness, colour and myriads of nutrients. Mostly consumed as fresh fruit, it is also dried, pickled and processed into jam, marmalade, fruit juice or canned (4). It is one of the first trees to flower in the spring and produces masses of white blossom. It matures at around 60-80 years, when trees are typically 20-25m in height with trunk of 50-70 cm in diameter (5). *Prunus avium* or sweet cherry is cultivated most widely in temperate region across the world, particularly in Turkey, United State and Iran. Other major producing areas include

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Mediterranean and Central Europe, North Africa,
New Zealand and Australia.



MICROSCOPY:

Tissues include the fruit cuticle, the dermal layers and the parenchymatous tissue. From water supplied through the vascular system, the fruits' parenchymatous cells build up tensile forces acting on the skin from inside the fruit. The fruit cuticle acts as a semipermeable membrane in this process, while the osmotically active solution is the apoplast fluid. A combination of the tensile forces acting on the fruit surface from inside the fruit and the loss of bearing structure of the fruit skin causes fruit cracking ⁽⁶⁾. Tissue samples for anatomical measurements were taken from twenty randomly leaves. The lamina thickness was found to be similar throughout the lamina width except lamina border and protruding veins area ⁽⁷⁾. Fruits are very rich in bioactive phytochemicals that can reduce the risk of developing chronic diseases ⁽⁸⁾.

TAXONOMIC CLASSIFICATION: ⁽⁹⁾

- **Kingdom:** Plantae
- **Sub-kingdom:** Viridiplantae.
- **Infra-kingdom:** Streptophyta
- **Super-division:** Embryophyta
- **Division:** Tracheophyta
- **Sub-division:** Spermatophytina
- **Class:** Magnoliopsida
- **Superorder:** Rosanae
- **Order:** Rosales

- **Family:** Rosaceae
- **Genus:** Prunus
- **Species:** Prunus avim

VERNICULAR NAME:

- **Kannada:** Cherry
- **English:** Sweet Cherry, Wild Cherry.
- **French:** Cerisier Des Bois, Guigne
- **German:** Waldkirsche, Vogelkirsche
- **Italian:** Ciliegio
- **Korean:** Yang Sal Gu
- **Portuguese:** Agriata, Cerejeira
- **Spanish:** Cereza, Celezo Negro.

HABITAT:

Cherry is a mesophytic, comparatively shallow-rooting, light demanding species, which can grow in quite different soil types. However, it favours deep fertile soils with a good water supply. The tree does not tolerate heavy clays, waterlogged or poorly drained sites and can be sensitive to drought. Main habitat type is semi shade, open deciduous woodland or scrubland especially at edges, glades and clearings, where this tree essentially occurs as a rare and scattered pioneer species. The pioneer colonization strategy is realized as a first-generation establishment via seedling recruitment, potentially followed by

sometimes extensive vegetative growth via root suckering ⁽¹⁰⁾.

DISTRIBUTION:

The natural range of wild cherry includes western Eurasia and the northern extremity of Africa. The latitude of its distribution ranges from about 30°-61° N and it is thought to have originated in the Caucasus and the surrounding area. Its distribution is typically very scattered and extended natural populations are rare. It is essentially a lowland species with a maximum altitude of about 1900 m reported in France. Archaeological and sub-fossil evidence indicates it is native to North West and Central Europe ⁽⁵⁾.

BOTANICAL DESCRIPTION:

Wild cherry (*Prunus avium* (L)) is a fast-growing but short-lived (100-150 years), medium sized deciduous tree, which grows to 15-32m height and with a stem diameter of up to 90 -120 cm³. The species mostly develops single, straight trunks with a thin, smooth purplish-grey bark that becomes grey brown with horizontal fissuring and peeling when old. Young trees grow with a strong apical control developing a straight trunk and an erect-pyramidal coniferous crown shape, becoming broader and rounded on single old trees or conical in individuals in forest stands. Young shoots are shiny, pale grey to purplish-brown, and have large, reddish brown and protruding ovoid-ellipsoid, glabrous winter buds at the branch ends arranged in whorl like form odourless in spring scarlet or wounds produce a resin-like, amber colored gum ⁽¹⁰⁾.

CULTIVATION:

(Sweet cherry, *Prunus avium* L) These species require favorable growth conditions like low winter temperature and cold climate. Due to

different heating and chilling conditions before flowering, there is variation in flower formation. Trees were trained under a freely growing system in a North-South orientation rows, and planted at 5.5 m between rows and spaced 3.0 m. Routine disease and pest control treatments were provided according to a commercial protocol for fruit production. The cherry was provided according to a commercial protocol for fruit production. The cherry orchard was fertilized and daily drip-Irrigated 3 h during night, between May and September, drippers were in line, 1m apart, and 41h flow rate) to ensure non-limiting nutrient and water conditions ⁽¹¹⁾.

COLLECTION:

Sweet cherries exhibit important biochemical and morphological changes like increase in colour intensity and sugar content during maturation which are considered as the main indicators of maturity. The maturity of the fruit varies within and between the planted trees; harvest time may change according to ecological conditions. Cherries harvested before optimal indices of colour and total soluble solids (TSS) are less acceptable by the consumers. The higher the colour & TSS content, the greater is the perception of quality. To avoid fruit cracking, fruit softening and rapid decay after harvest as a result of rain, premature picking of sweet cherries is practiced by growers ⁽¹²⁾.

PHYTOCHEMISTRY:

Sweet cherry is a great source of many phytochemicals, nutrients, phenolic compounds, sugars and organic acids. The phytochemicals extracted from sweet cherry act as a secondary metabolite. It consists of anthocyanins, perillyl and phenolic compounds including cyanide-3-rutinoside and flavanol p-coumaric acid having importance in anti-cancer and anti-

oxidation activities¹³. Additionally, other non-phenolic phytochemicals reported in the sweet cherry were volatile compounds, carotenoids, serotonin and melatonin.

Their contents are more concentrated in exocarp than in the flesh of cherries.⁽¹⁴⁾ Sweet cherry also contains other major constituents like carbohydrates, alkaloids, flavonoids, proteins, saponin, phenols, glycosides and terpenoids.

PHARMACOLOGICAL ACTIVITIES:

Anti-diabetic:

Cherry fruit and its by-products contain several phytochemicals, mainly anthocyanins, phenolic acids, and flavan-3-ols, which have demonstrated biological activities such as antioxidant and antidiabetic properties. The literature reports compelling evidence of the benefits ascribed to the long-term consumption of phenolics in the prevention of several oxidative stress-induced diseases such as diabetes mellitus (DM)⁽¹⁵⁾.

Anti-oxidant:

Antioxidants act as free radical hunters, they inhibit or delay the oxidation of other molecules and they prevent and repair damage done by the free radicals in oxidant-antioxidant system. Additives certain fruits which are rich in the variety of antioxidants have pharmaceutical aspects and they can be used to protect against diseases, including cancer and cerebrovascular diseases. Many researches focused on fruits which are rich sources of phenolic compounds such as chlorogenic acid, rutin, quercetin and (+)-catechin. Prunus family exhibits high antioxidant activity and the plums have high level of phenolic contents⁽¹⁶⁾.

Anti-inflammatory activity:

The anti-inflammatory effects of flavonoids are well described in the literature and have been used for a long time. These compounds are exogenous antioxidants capable to reducing ROS by inhibition of specific enzymes (e.g., NO and xanthine oxidase synthases), and also by regulation of ion channels. Moreover, flavonoids reduce the inflammatory state by inhibiting regulatory substances, such as NFkB, activator protein-1 (AP-1), interleukin-1 beta (IL-1 β), tumor necrosis factor alpha (TNF-a), interleukins 6 and 8, and COX-2⁽¹⁷⁾.

Anti-cancer activity:

It has been investigated that sweet cherry extracts (EAAEC & EEC) possess good anticancer potential against human breast cancer cell line MCF-7 as indicated by in-vitro studies using MTT assay. The cytoprotective effects of sweet cherries have been extended in the last few years to the metabolic reprogramming of cancer cells, invasion and migration and the regulation of cell death and proliferation. It is quite exciting to demonstrate the broad action of sweet cherries over several hallmarks of cancer⁽¹⁸⁾.

CONCLUSION:

This review has widely Explained about phytochemical properties of prunus avium which is having nutritional and medicinal value higher than the other commonly using fruits, it contains phenolic acid, flavonoids, carbohydrates, proteins, saponins, alkaloids, glycosides, anthocyanins, sugars & organic acids such glucose, fructose & maleic acid, succinic acid respectively. It also includes several health beneficial nutrients and fibers. Prunus avium has notable pharmacological activities including anti-oxidant, anti-diabetic, anti-cancer, anti-inflammatory and anti-diuretic activity. Although many studies have been conducted to evaluate the efficacy of prunus



avium, still further studies need to be done to investigate its other medicinal properties.

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