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Ethnopharmacology and phytochemistry of some representatives of the genus *Prunus*

Етнофармакология и фитохимия на някои представители на рода *Prunus*

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ABSTRACT

Representatives of the Prunus genera, found in almost every country and continent, have been recognized not only for their delicious fruits and nuts, but also because of their beneficial properties. To date, numerous cultivars have been phytochemically studied, leading to the identification of various compounds including terpenes, tannins, flavonoids, phenolic acids, carotenoids, fatty acids, and so on. Pharmacological studies on Prunus species have also revealed a variety of bioactive potentials including antioxidant, anti-inflammatory, hypolipidemic, antidiabetic, brain protecting, and other evidence based uses. This review covers articles, retrieved from scientific databases, using "*Prunus*" as search term ("all fields") and with a specific time frame set for search. Information about *Prunus amygdalus*, *Prunus armeniaca*, *Prunus cerasifera*, *Prunus persica*, *Prunus domestica*, *Prunus avium*, and *Prunus cerasus* was selected and summarized giving information about their ethnopharmacological uses, isolated phytochemicals, and pharmacological activities.

Keywords: fruit, natural remedy, phytochemicals, wellbeing

АБСТРАКТ

Представители на род *Prunus* могат да бъдат открити в почти всяка страна и континент. Те са признати не само заради вкусните си плодове и ядки, но и заради полезните си свойства. Към днешна дата многобройни сортове са фитохимично проучени, което е довело до идентифицирането на различни съединения, включително терпени, танини, флавоноиди, фенолни киселини, каротеноиди, мастни киселини и др. Фармакологичните проучвания върху видовете *Prunus* разкриват различни биоактивни потенциали, включително антиоксидантни, противовъзпалителни, хиполипидемични, антидиабетни, предпазващи мозъка и други приложения, базирани на научни доказателства. Този обзор обхваща статии, извлечени от научни бази данни, използващи „*Prunus*" като термин за търсене („всички полета") и със специфична времева рамка, зададена за търсене. Подбрана и обобщена е информация за *Prunus amygdalus*, *Prunus armeniaca*, *Prunus cerasifera*, *Prunus persica*, *Prunus domestica*, *Prunus avium* и *Prunus cerasus*, давайки информация за техните етнофармакологични употреби, изолирани фитохимикали и фармакологични дейности.

Ключови думи: плод, природен лек, фитохимикали, благосъстояние

INTRODUCTION

Fresh fruits production contributes to the sustainability of the food system because it reduces energy consumption and generates less carbon dioxide emissions since it does not need to be transported from remote farming areas (Vargas et al., 2021). Furthermore, one fruit tree consumes about 20 kg of CO_2 per year, which can significantly aid in the carbon imprint reduction (Aguilera et al., 2014). Encouraging the consumption of the fruit with its skin, where possible, minimizes waste.

A growing body of evidence shows that man has reached a turning point where a "plant-based diet" is on the agenda. In the early 21st century, nutritionists began to highlight the benefits of plant-based foods (Hever and Cronise, 2017). There is an ambition to provide affordable, natural and personalized food. A lifestyle that promotes the consumption of foods that contribute to a healthy diet and have less impact on the planet's ecosystem is encouraged (Clark et al., 2020). Faced with challenges such as climate change, resource scarcity, malnutrition, obesity and health problems, consumers must focus on sustainable and healthy nutrition (Bilali et al., 2018). Fruit production is undoubtedly of great importance in the agricultural sector because of its economic importance and its beneficial effects on human health.

A quick look at the databases with the keyword “Prunus” shows that, in Scopus, 14,588 results appear for the last decade and 2,880 are published in 2020-2021 (Scopus database); in Web of Science databases 9,618 results appear for the last ten years and 2,112 in particular for 2020-2021 (Web of Science database); in Google scholar about 93,900 results are found and about 33,200 results account for the previous 24 months (assessed on 27/04/2022) (Google Scholar database). In this regard, a detailed, concise and comprehensive review of the ethnopharmacology and phytonutrients of the genus Prunus would be reasonable and helpful.

ETHNOPHARMACOLOGY AND HUMAN HEALTH

Plants produce various low and high molecular weight secondary metabolites which belong to different chemical groups such as phenols, flavonoids, alkaloids, terpenes, etc. (Kasote et al., 2015). The biosynthesis of these phytochemicals is substantially affected by environmental stress conditions (seasonal changes, geographical location, plant maturity, soil type), farming practices, and postharvest handling (Adegbaju et al., 2020). The concentration of phytochemicals can greatly vary according to the plant part, and growth phases (Lagnika et al., 2016). The phytochemical profile is known to fluctuate (rise or decrease) depending on maturation as well (Gündoğdu et al., 2013). Ethnopharmacological knowledge plays an important role in the conservation of plant diversity. Different cultures have their own availability of indigenous plants that are used depending on geography and ecology. Modern society uses plants as source of food and medicine. Bearing in mind the impact of climate change on plant phenology, it is important to prioritize conservation efforts and have sustainable plant application and usage (Mir et al., 2021).

Numerous scientific research exists in terms of natural ingredients in food and possible effects on human health. The continuous pursuit for health conservation and disease prevention leads a path for the search of natural sources with health-supporting properties. Plant foods, such as vegetables and fruits are reported to contain significant amounts of bioactive phytocomponents, that can provide a wide spectrum of desired health benefits beyond basic nutrition, such as reducing the risk of chronic diseases (Liu, 2013). Increased consumption of polyphenol-rich foods and beverages has been associated with a decrease in cardiovascular disease (Hooper et al., 2012). In addition, some authors (Liu et al., 2014) associate polyphenol-rich foods and beverages with a lower risk of stroke and type 2 diabetes. Increasing flavonoid intake is also a way of moderately reducing the risk of stroke (Tang et al., 2016). Furthermore, flavonoids have been reported to provide both antioxidant and antithrombotic properties (Babu and Liu, 2009). Vegetables and fruits containing polyphenolic compounds are thought to play a protective role against various forms of disease (Cory et al., 2018). Antidiabetic and antioxidant properties of polyphenols have been reported (Ji et al., 2019).

Plants are recognized as important sources for disease treatment and control. Alternative medicine is a term used to describe medicinal products that are not part of the standard medical care. Many conditions can be treated with the help of natural products. Fruits in general have numerous beneficial phytochemicals and many researchers report both *in vivo* and *in vitro* their consumption benefits (Table 1).

Genus Prunus have proven their potency for being sources of phytochemicals with nutritional, functional and protective properties. The phytochemical constituent profiles of *Prunus armeniaca* L. leaf extracts reveal that it can have an effective anti-obesity action via inhibition of pancreatic lipase, cyclooxygenase-1, and antioxidant capacity, especially the oxygen radical absorbance capacity (Wojdyło and Nowicka, 2021). *P. cerasus* has presented effective gastro-protective (employing a possible decline of the pro-inflammatory TNF-alpha), antinociceptive (decline in IL-6), and anti-inflammatory effects (elevation of the anti-inflammatory factor IL-10 levels), spleen-regenerative and anti-oxidative stress ameliorative mechanism (Raafat et al., 2020). The *Prunus persica* fruit (pulp and peel) can aid in the reduction of the risk of cardiac and brain disorders, as well as cancer due to the presence of phenolic compounds and carotenoids which numerous studies have proven to exhibit antioxidant and anti-inflammatory effects (Seo et al., 2020).

The therapeutic properties of the peach (fruits, stones, flowers and leaves) have been used for years, especially in Chinese folk medicine. The fruits of the *P. persica* have been attributed many health-promoting properties in diseases of the heart, kidneys, liver and gall bladder; peach blossoms - in diseases of the stomach and rheumatism; leaves have antimycotic and bactericidal properties (Chang et al., 2016). Fruit being aphrodisiac, anti-pyretic, acts as a tonic to the brain, enhances the blood, removes bad smell from the mouth, promotes anti-tumor activities (Fukuda et al., 2003). The seeds are used as an anthelmintic and emmenagogue (Suh et al., 2006).

An apricot-rich diet has shown a considerable preventive role on the histopathological changes caused by alcohol in *in vivo* studies, and also reported a promising impact in the renal diseases treatment (Kurus et al., 2009). Some apricots, like the Japanese one, are linked to having gastric preventive properties (Yiğit et al., 2009). A recent *in vivo* study revealed that the seeds of the bitter apricot can positively modulate the lipoprotein profile in the group with elevated total cholesterol, but further studies are still needed to support the findings long-term (Kopčeková et al., 2022).

Table 1. Common ethnopharmacology aspects of some Prunus species

Species (Common name)	Chemical representative	Natural treatment properties	Reference
Prunus amygdalus (almond)	phytosterols; flavonoids; alkaloids; vitamins	enzyme inhibition; cholesterol control; memory enhancing	Keser et al. 2014
Prunus armeniaca (apricot)	flavonoids, polyphenols, carotenoids, phenolic acids	anti-inflammatory; immune-stimulating; control of lipid and glucose/insulin metabolism; antioxidant	Roussos et al., 2011; Fratianni et al., 2022
Prunus cerasifera (cherry plum)	tannins, flavonoids, phenolic acids	melanogenesis inhibitor, anti-tyrosinase and antioxidant, antifungal, antibacterial activity	Saraswathi et al., 2020; Jaffri and Ahmad, 2018
Prunus persica (peach/nectarine)	quercetin, catechins, carotenoids, organic acids, enzyme inhibitors	diabetes, obesity, hypertension control, inflammation, antioxidant activity	Bento et al., 2020; Szwajgier et al., 2020
Prunus domestica (plum)	anthocyanins; soluble fibers, flavonols	antioxidant, anti-carcinogen, cardio preventive, antimicrobial, anti-viral, and neuroprotective agents	Tomić et al., 2019; Igwe and Charlton, 2016
Prunus avium (sweet cherry)	phenolic acids; flavonoids; anthocyanins	antidiabetic, anti-neurodegenerative; anti-inflammatory	Gonçalves et al., 2021; Nunes et al., 2021
Prunus cerasus (sour cherry)	polyphenols; polyunsaturated fatty acid	enzyme inhibition; diabetes control; gastroprotective	Raafat et al., 2020; Kim et al., 2021;

Plums consumption is associated with the growth of beneficial gut bacteria, the reduction of fat deposits in tissues, and the improvement of lipid (Siddiqui, 2017). Dried plums are broadly famous for their laxative effect and are also being acknowledged for their role in bone health (Wallace, 2017). Plums and prunes are known for their stomachic effect. The plant's bark is used as febrifuge. Roots of *P. domestica* are used as astringent. Its seeds produce fatty oil, which can be used as a substitute for almond oil.

Consumption of tart cherry fruit shows decreased oxidative stress markers (Lynn et al., 2014). Regular cherry intake is also known to improve cognitive function and memory (Thangthaeng et al., 2016). Few reports comment on a positive sleep function, arthritis condition, and diabetes management but more evidence is needed in order to support those claims. Sour cherries can decrease diastolic blood pressure, but have effect on systolic values (Han et al., 2020). Due to its high content in antioxidants, such as phenolic compounds and vitamins, *P. avium* possessed several beneficial effects such as prevention of cardiovascular diseases, cancer and other diseases related to oxidative stress (Serra et al., 2011). In recent years, research papers on the relationship of the phenolic compounds content and the antitumor potential of *P. avium* fruit extracts have been reported (Serra et al., 2011). Cherry (sweet and sour) stems are documented as a valuable and less exploited by-product rich in phenolic secondary metabolites (flavonoids, naringenin derivatives), with potential applications as a mild and safe diuretic agent (Babotă et al., 2021).

Almond intake reduces lipid peroxidation biomarkers in hyperlipidemic patients, and improves the serum lipid profile (Phung et al., 2009). Extracts of leaves, flowers and seeds of almonds can aid in the diabetes control (Shah et al., 2011). Furthermore, almonds managed to induce a decrease in the Herpes simplex virus (HSV-2) replication (Arena et al., 2010). A large study revealed the uricemia-lowering effect of a regular 10 g/day almond consumption (Phung et al., 2009). The *Prunus amygdalus* nuts are reported to retain several pharmacological properties, like anti-stress (Bansal, 2009), antioxidant, immunostimulant (Puri et al., 2000), lipid-lowering (Spiller et al., 1998), and laxative (Jabeen et al., 2019). The almond can preserve brain vitality, strength the muscles and extend life.

Cherry plum fruits are rich in health-promoting phytochemicals that help prevent various diseases. Authors discuss the high content of biologically active substances like flavonoids (catechins, leuko-anthocyanins), flavonols and anthocyanins (Dunaevskaya et al., 2021). The *P. cerasifera* fruit has strong antibacterial and antifungal potential of pathogenic class for medical sciences and agricultural product-related pathogens (Gunduz et al., 2012). The prune fruit is reported to possess high antioxidant activity (9.56 mg), which is directly linked to a content of biologically active compounds, including phenolic compounds (1.8 g/100 g) (Putkaradze et al., 2021).

Recent research shows growing interest in studying not only fruits but their petioles and leaves as well. In fact, the petioles of the sweet cherry have been reported to possess high antioxidant activity and polyphenol content (Dziadek et al., 2018). These findings can serve as ingredients of new functional food products targeting the prevention and treatment of chronic non-communicable diseases. Based on the phytochemicals presented in *Prunus* spp. many research studies are focused on their antioxidant potential (Wojdyło et al., 2014; Dziadek et al., 2018; Tomić et al., 2019; Mihaylova et al., 2021b). All plant parts, incl. leaves, peels, kernels, pulp, whole fruit (Yiğit et al., 2009; Dziadek et al., 2018; Mihaylova et al., 2021b) can be successfully utilized in this regards. *Prunus* spp. have demonstrated powerful antioxidant activity reported by several methods due to the analysis of the total content of antioxidant molecules (i.e. flavonoids, anthocyanins, carotenoids, vitamin C) (Table 1.) that are reported to overcome some of the degenerative diseases affecting humans. It is eminent that the consumption of fresh fruits with a high radical scavenging capacity is associated with better overall health. Different authors have focused their work on the *Prunus* spp. representatives, and have documented their excellent antioxidant potential.

The plum showed strong antioxidant potential (Bahrin et al., 2022) dependent on the presence of phenolic compounds (Kayano et al., 2002), whereas the cherry plum potential was reported to be based on the level of ripening (Miletic et al., 2012). Considering the wide range of the *Prunus* spp. most researchers agree that they are promising sources of antioxidant potential. Furthermore, a recent trend is the valorization of agro-wastes from fruit processing (Jimenez-Lopez et al., 2020) as an antioxidant potential source.

Gut health is of major public importance. The WHO (2003) has recommended a daily intake of at least 5 portions of fruit and vegetables. A high fruit and vegetable intake is related to a lower hypertriglyceridemia occurrence (Kjøllesdal et al., 2016). Dried fruits (e.g. prunes and apricots) can exhibit gut health-promoting properties because of their high range of dietary fibers and other bioactive compounds (e.g. polyphenols) (Sadler et al., 2019).

Contemporary eating patterns have revealed a global trend for snacking. Therefore, healthy snacks have become very important in order to control appetite and prevent excessive calory intake. Fruits can aid in this direction by providing health-promoting compounds, no added sugar, and a palette of vitamins and minerals. It has to be noted though that fruits, especially dried ones, as seen as potentially causing the development of tooth cavities (Moynihan and Kelly, 2014). This may not be directly linked to their sugar content but to their acidic nature which is generally harmful to the dental health (Office for Health Improvement and Disparities, 2017).

PHYTOCHEMICAL CONSTITUENTS AND NUTRIENTS OF THE GENUS PRUNUS

Fruits and vegetables are among the most important sources of phytochemicals worldwide. Furthermore, approximately 200,000 phytochemicals are known to date, and 20,000 of them have been identified as derived from fruits, vegetables and cereals in particular (Patra, 2012). Phytochemicals possess a number of health effects against many diseases, as well as antibacterial, antifungal, antiviral, cholesterol-lowering, antithrombotic or anti-inflammatory effects (Schreiner and Huyskens-Keil 2006). In this regard, the phytochemical constituents' profile of the *Prunus genus* is of particular interest.

Prunus species are rich in various secondary metabolites such as flavonoids, steroids, terpenes, phenolic acids, phenylpropanoid esters, carotenoids, gibberellins, carbohydrates, etc. (Poonam et al., 2011). Not only phytochemicals, but also vitamins and minerals are of great importance to human nutrition and well-being. By default, fruit are recognized as food sources that are abundant in a palette of vitamins minerals, and bioactive compounds.

Most of the Prunus representatives possess a distinct volatile profile which is usually very important not only from a sensory point of view, but also considering the chemicals contributing to this VOCs (volatile organic compounds) profile. The composition and concentration of the volatile compounds varied greatly but terpenoids and aldehydes are typical for apricots (Zhang et al., 2014); aldehydes, alcohols, ketones and esters for sweet cherries (Villavicencio et al., 2021); esters, terpenoids, aldehydes, alcohols, and ketones for plums (Pino and Quijano, 2012); alcohols and aldehydes for raw almonds (Franklin and Mitchell, 2019); aldehydes, esters, and fatty acids for peaches (Mihaylova et al., 2022).

Apricot (Prunus armeniaca L.)

Not only has the apricot fruit a delicious taste, alluring smell, and vivid colors, but also numerous nutritional properties due to its rich content of vitamin C (3.04 – 16.17 mg/100g fw), β-carotene (32.2 – 143.3 mg/kg dry matter depending the days after blossom), as well as phenols (492.20 – 649.12 g/kg), carotenoids (20.983-320.278 μg/g fw), and tocopherols (1.43 mg/kg) (Karabulut et al., 2021; Zhou et al., 2020; Wojdyło and Nowicka, 2021). The apricot fruit (*Prunus armeniaca* L.) is considered a good source of total phenolics, flavonoids and bioactive compounds with health application. A HPLC analysis revealed the presence of five different phenolic compounds (chlorogenic acid, syringic acid, quercetin 3-rutinoside, catechin, and epicatechin) in the apricot fruit samples. Catechin was the predominant phenolic compound in all apricot samples studied obtaining values from 70.1 to 129.6 mg/100 g dry matter, followed by quercetin 3-rutinoside and epicatechin, which belong to the flavonoids group (Vega-Gálvez et al., 2019).

An ICP-OES analysis shows the presence of calcium (447.2 mg/kg), phosphorus (365.75 mg/kg), magnesium (355.3 mg/kg), copper (80.19 mg/kg) and iron (37.25 mg/kg) in larger quantities (Sharma et al., 2014). The apricot is known to be a rich source of carotenoids, especially β-carotene (10.09-18.13 mg/100 g), which represents 50% of the total carotenoids in the fruit (Ali et al., 2011). Sucrose was the predominant sugar ($P<0.05$) in the apricot (Alajil et al., 2021); glucose (5.92 mg/100 g dry matter), fructose (7.25 mg/100 g dry matter), and sorbitol (5.90 mg/100 g dry matter) were the other major components (Vega-Gálvez et al., 2019). Levels of phenolic compounds in the apricot peels were approximately 2–4 times higher than those of the pulps. Quercetin-3-rutinoside may be substantially responsible for the antioxidant capacities of the peels (Fan et al., 2018). A recent study has established that there is an increase in the phenolic content during ripening, and the highest values were obtained at the half-ripe stage (Iordanescu et al., 2018). β-carotene was the main pigment found in 37 studies apricot varieties, followed by β-cryptoxanthin and γ-carotene (Ruiz et al., 2005).

Peach (Prunus persica (L.) Batsch)

Peaches are nutritionally and economically important and they are one of the most popular fruits consumed worldwide. Peach peels are reported to be much beneficial than the pulp. They contain more dietary fibers, polyphenols, and phenolic acids (Mihaylova et al., 2021b). Authors have proven that the color of the pulp can affect the phytochemical content, meaning that red-fleshed peached contain more anthocyanin, while yellow-fleshed peaches were richer in carotenoids (Vizzotto et al., 2007). Some of the carotenoids identified in fresh peaches are zeaxanthin (0.8 ± 0.1 µg/g), lutein (0.2 ± 0.00 µg/g), β-cryptoxanthin (0.2 ± 0.04 µg/g) and β-carotene (0.1 ± 0.02 µg/g) (Oliveira et al., 2012).

Chlorogenic (5.22 mg/g dw), protocatechuic (94.40 µg/100 g) and p-coumaric (17.83 µg/100 g) acids are reported as the most present in the peach varieties (Mihaylova et al. 2021b). The phytochemical analyzes of peaches revealed the presence of organic acids, vitamins (A, B, C), catechin, epicatechin, cyanidin and quercetin derivatives at various quantities (Bento et al. 2020). Peach phenolics have displayed a number of beneficial properties, but their potential is seen in the prevention of neurogenerative diseases (Alzheimer's) (Mihaylova et al. 2021a). Red-flesh peaches are particularly high in anthocyanins, flavanols and cinnamic acids compared to white and yellow ones (Serra et al., 2020). The total phenolic concentration was proven to be largely dependent on the cultivar (Serra et al., 2020). The most abundant sugar in ripe peaches is sucrose, followed by the reducing sugars (glucose and fructose) (Lachkar et al., 2020).

Plum (Prunus domestica L.)

Plums have a variety of flavors, textures and distinct favorable aroma. Plums are a rich source of nutritive and bioactive compounds, and are widely cultivated throughout the world based on the famous juicy, and nutritious fruit quality they produce (Song et al., 2018). Several phytonutrients contribute to this fruit being considered one of the most important commodities consumed worldwide (Díaz-Mula et al., 2008), and having antioxidant activity (Díaz-Mula et al., 2008; Kristl et al., 2011). The plum phytonutrients are reported to be conditional on the manner of the species, cultivar (Díaz-Mula et al., 2008), ripening stage (Díaz-Mula et al., 2008; Usenik et al., 2009) and storage (Díaz-Mula et al., 2008) affecting on various anthocyanins, ascorbic acid, α, γ-tocopherols, and β-carotene, minerals, flavonols, etc.

The plum fruit comprises of some important biologically active compounds, including anthocyanins, flavan-3-ols, phenolic acids, tocopherols, phylloquinone, and carotenoids (Igwe and Charlton, 2016). The most presented compounds from the phenolics was the chlorogenic acid with 6.0-62.3% of the total phenolic compounds amount (Liaudanskas et al., 2020). The fruit of *Prunus domestica* is represented by a vast palette of phenolics compounds with caffeoylquinic acid isomers being predominant (Raynal et al., 1989). More recent research showed the presence of p-coumaric (1.863 mg/kg fw), vanillic (0.359 mg/kg fw), protocatechuic (1.872 mg/kg fw), and caffeic (9.729 mg/kg fw) acids (Celik et al., 2017) as well as β-glucoside and a novel compound 4-amino-4-carboxychroman-2-one (Kayano et al., 2002). A study of the primary and secondary metabolites of eighteen Serbian plum cultivars showed a significant variation of the sugars/acids ratio, anthocyanins and flavanols content (Tomić et al., 2019). The dried plum is rich in neochlorogenic and chlorogenic acids (Kikuzaki et al., 2004), carbohydrates (fructose 1.38 g/100 g, sucrose 2.75 g/100 g, glucose 2.11 g/100 g, sorbitol 1.18 g/100 g), organic acids (citric acid 25.8 mg/100g, malic acid 2.02 g/100 g), vitamins (α-tocopherol 446 mg/100 g, γ-tocopherol 9.7 mg/100g, β-carotene 107 mg/100 g), and minerals (sodium 1.2 mg/100 g, potassium 201 mg/100 g, magnesium 5.7 mg/100 g, calcium 4.49 mg/100 g, iron 0.27 mg/100 g, zinc 0.27 mg/100 g) (Lombardi-Boccia et al., 2004). Plums can be revealed as sources of dietary fibers and a successful tool for the reduction of cholesterol levels (Walkowiak-Tomczak, 2008).

Cherry (Prunus avium L.)

The fruits of sweet cherry consist of a moderate amount of carbohydrates, especially simple sugars (e.g., glucose, fructose, sucrose and sorbitol), and organic acids (e.g., malic, citric, succinic, lactic and oxalic acids) (Usenik et al., 2010; Pacifico et al., 2014). As an advantage these fruits have a low glycemic index (Brand-Miller et al., 1999) and are also considered a source of vitamins, especially vitamin C (from about 2.2 to 10.2 mg/100 g fw) (Schmitz-Eiberger and Blanke, 2012). They also contain minerals, such as potassium (9267-16778 ppm), phosphorus (585-1546 ppm), calcium (510-2438 ppm) and magnesium (1012-2113 ppm) (Yiğit et al., 2009). The levels of the abovementioned is highly influence by the foliar application of nutrients (Bustamante et al., 2021). In addition, sweet cherry fruits present high levels of water, reduced levels of fat, particularly saturated fat, cholesterol-free and low-calorie content (McCune et al., 2011). Sweet cherry fruits contain various phenolic compounds, including phenolic acids (hydroxycinnamic derivatives) and flavonoids (anthocyanins, flavan-3-ols and flavonols), which are associated with their antioxidant potential (González-Gómez et al., 2010; Usenik et al., 2010; Serra et al., 2011b; Pacifico et al., 2014). Research continues to support the abundant health benefits of cherries due to their total phenolic content of 1.73 ± 0.9 mg GAE/g, and total flavonoid content of 0.31 to 0.51 mg QE/g (Hu et al., 2021).

Cherry plum (Prunus cerasifera Ehrh.)

Cherry plum is an important medicinal plant. As a representative of prune fruits, various phytochemicals have been reported (Birwal et al., 2017). *P. cerasifera* fruit consists mainly of phenolic constituents, many types of anthocyanins (from 1.93 to 19.86 g/kg in the fruit peel) and antioxidant components (Wang et al., 2012). Among the anthocyanins found in *P. cerasifera* fruit are cyanidin-3-galactoside, cyanidin-3-xyloside, cyanidin-3-glucoside, cyanidin-3-rutinoside, peonidin-3-glucoside, peonidin-3-rutinoside, pelargonidin-3-glucoside and yanidin-3-(6”-acetoyl) glucoside whereas the antioxidant activities of the extracts were good correlated with the anthocyanins and total phenolics content (Stefanut et al., 2015). Several biological active compounds were reported to be present in addition - quercetin, quercetin glucoside, quercetin rutinoside, quercetin arabinopyranosyl, epicatechin, procyanidin C, chlorogenic acid (11.95 mg/kg fw), xyloside, catechin, procyanidin B1, quercetin galactoside and procyanidin B2 (Jaffri and Ahmad, 2018). A number of phenolic acids were reported as well (chlorogenic, syringic, caffeic acids etc.) in addition to organic acids and antioxidant potential (Celik et al., 2017). The chlorogenic acid content was reported to be 11.95 mg/kg fw and the syringic and caffeic acids content 3.288 and 3.334 mg/kg fw, respectively. As regards the organic acids the main presented were vitamin C (18.985 mg/100 g fw) and citric acid (13.898 mg/100 g fw) (Celik et al., 2017).

Sour/tart cherry (Prunus cerasus)

Sour cherries are documented to be health-enhancing due to their phenolic compounds (254.0-407.0 mg of total polyphenol/100 g FW). Sour cherries are found to contain high quantities of anthocyanins (cyanidin-glycosylrutinoside), flavonoids (quercetin-rutinoside) and chlorogenic and neochlorogenic acids (Mayta-Apaza et al., 2018). The principal phenolic acids reported in literature are 3-caffeoylquinic, 5-caffeoylquinic and p-coumaric acids (Wojdyło et al., 2014). Catechin and epicatechin derivatives as well as glycosides of quercetin and kaempferol are also identified in the fruit. An ultra-performance liquid chromatography analysis showed the presence of chlorogenic acid (20.9 mg/L), quercetin (8.2 mg/L), and kaempherol 94.57 mg/L) (Wojdyło et al., 2014). Reports on the good antioxidant properties of tart cherries also exist (Redondo et al., 2016). The main organic acid in sour cherries is malic acid, which accounts for 78.2–88.3% of the total organic acids (Sokół-Łętowska et al. 2020). The sugar profile consists mainly of glucose (2.81-5.37 g/100 g FW), fructose (2.74-4.88 g/100 g FW) and sucrose (1.03-1.38 g/100 g FW) (Sokół-Łętowska et al., 2020). Tart cherries are good sources of potassium (Sabou et al., 2021).

Almond (Prunus dulcis)

Almonds are plentiful in vitamins, minerals, mono-saturated and polyunsaturated fatty acid (Jaceldo-Siegl et al., 2004). Almonds can be seen as a treatment for anaemia, because they contain minerals and vitamins. The content of minerals is represented by phosphorus (200-1050 mg/100 g), potassium (390-940 mg/100 g), calcium (190-1300 mg/100 g) and magnesium (90-610 mg/100 g) (Yada et al., 2011). Vitamin E and B are most common in almonds as tocopherols and α-tocopherol in particular is the main representative (8.5-84 mg/100 g). Almonds contain a variety of phenolic compounds i.e. flavonoids, anthocyanins, procianidins, and phenolic acids (Rao and Lakshmi, 2012). The phenolic content can vary in a wide range from 0.05 mg GAE/g to 2.41 mg GAE/g (Oliveira et al., 2020). Partial information is offered on the identification of isoflavones, lignans and stilbenes, with the identification, in most cases, of aglycone structures, after chemical or enzymatic hydrolysis (Barreca et al., 2020). The major stilbene (identified and quantified) is resveratrol-3-O-glucoside (Kuhnle et al., 2008). Large number of phenolic compounds are reported for different genotypes of Spanish almonds including flavan-3-ols(+)-catechin (16.58 mg/100 g fw) and (−)-epicatechin (13.35 mg/100 g fw) (Moreno Gracia et al., 2021). Almonds are reported to possess a health-enhancing lipid profile which includes elaidic, oleic, α-linolenic, and palmitic acids (Valdés et al., 2015). Almonds are documented for their high arginine content (2.465 g/100 g protein) (Yada et al., 2013; Barreca et al., 2020). Recent findings continue to support the nutritional value and biological activity of almonds proving that they are rich in fat (MUFA 60% and PUFA 30%), vitamins (vitamin E, vitamin B, etc.), minerals (manganese (1.11-2.56 mg/100 g), magnesium (154-300 mg/100 g), copper (0.72-3.90 mg/100 g) and phosphorus (191-526 mg/100 g)) and diverse bioactive compounds (hydrolysable tannins, proanthocyanidins and flavonoids) (Barreca et al., 2020).

FUTURE INSIGHT AND PERSPECTIVE

The importance of the conservation of the genetic variation of Prunus species is at high priority. Predictions of climate change indicate that a likelihood of habitat loss can lead to difficulties in tree cultivation. The genetic fingerprinting profiles contribute to an easier registration of cultivars, and aid in the molecular-marker-assisted breeding within the genus Prunus (Acuña et al., 2019). Unlocking the peach DNA sequence gives researchers a tool for building new knowledge and genetically manipulating the species in order to receive specific characteristic, i.e., healthier fruit, desired flesh color, nutritional quality, and overall acceptance from the consumer (da Silva Linge et al., 2021). Scientists see perspective in unraveling the process of transformation from unripe to ripe fruit which is still not studied well enough (García-Gómez et al., 2021). Many studied on the subject of regeneration and genetic improvement exist, but an ongoing challenge is the low level of correspondence between cells competent for transformation (Ricci et al., 2020). A major breakthrough in plant breeding will be the ability of the tree to survive spring frost during blossoming. Frost resistance is a desired key feature yet to be created. Altering the ripening period is also a challenging study objective. Identifying molecular markers corresponding to quality markers can increase fruit supply for longer periods of time (Veerappan et al., 2021).

CONCLUSION

Prunus plants representatives are largely distributed in many countries. Prunus fruits have been highly cherished for their delicious fruits but the literature search shows that the phytochemical compounds isolated from different *Prunus* spp. extracts retain a wide range of valuable effects including antioxidant, anti-inflammatory, hypolipidemic, antidiabetic, brain protecting, and other evidence based uses. This review overviews the existing literature on the phytochemistry and ethnopharmacology of the genus Prunus. The results from the research clearly show that *Prunus* spp. have beneficial therapeutic properties due to their isolated phytoconstituents. However, further *in vivo* studies should be exerted in order to test their efficacy for the human. Moreover, it would be necessary to conduct studies on the application of other parts like leaves, barks, and flowers. Such research can identify even more biomolecules that may be accountable for major health benefits. Nowadays, special attention is paid to the traditional uses and ethnopharmacology of natural compounds, especially of plant origin and efforts have been made to verify their relevant pharmacological activities. Sustainable harvesting is often emphasized.

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REFERENCES

Acuña, C.V., Rivas, J.G., Brambilla, S.M., Cerrillo, T., Frusso, E.A., García, M.N., Villalba, P.V., Aguirre, N.C., Sabio y García, J.V., Martínez, M.C., Hopp, E.H., Marcucci Poltri, S.N. (2019) Characterization of genetic diversity in accessions of *Prunus salicina* lindl: keeping fruit flesh color ideotype while adapting to water stressed environments. Agronomy, 9, 487. DOI: https://doi.org/10.3390/agronomy9090487

Adegbaju, O.D., Otunola, G.A., Afolayan, A.J. (2020) Effects of growth stage and seasons on the phytochemical content and antioxidant activities of crude extracts of *Celosia argentea* L., Heliyon, 6 (6). DOI: https://doi.org/10.1016/j.heliyon.2020.e04086

Aguilera, E., Guzmán, G., Alonso, A. (2014) Greenhouse gas emissions of organic and conventional cropping systems in Spain. II. Fruit tree orchards. Agronomy for Sustainable Development, 35, 725-737. DOI: https://doi.org/10.1007/s13593-014-0265-y

Alajil, O., Sagar, V.G., Kaur, C., Rudra, S.G., Sharma, R.R., Kaushik, R., Verma, M.K., Tomar, M., Kumar, M., Mekhemar, M. (2021) Nutritional and phytochemical traits of apricots (*Prunus armeniaca* L.) for application in nutraceutical and health industry. Foods, 10 (6), 1344. DOI: https://doi.org/10.3390/foods10061344

Ali, S., Masud, T., Abbasi, K.S. (2011) Physico-Chemical Characteristics of Apricot (*Prunus armeniaca* L.) grown in northern areas of Pakistan. Scientia Horticulturae, 130 (2), 386–392. DOI: http://dx.doi.org/10.1016/j.scienta.2011.05.040

WHO (2003) Diet, nutrition and the prevention of chronic diseases. World Health Organization, Geneva. DOI: https://doi.org/10.1093/ajcn/60.4.644a

Arena, A., Bisignano, C., Stassi, G., Mandalari, G., Wickham, M., Bisignano, G. (2010) Immunomodulatory and antiviral activity of almond skins. Immunology Letters, 132 (May), 18–23. DOI: https://doi.org/10.1016/j.imlet.2010.04.010

Babotă, M., Voştinaru, O., Păltinean, R., Mihali, C., Dias, M.I., Barros, L., Ferreira, I. C.F.R., Mocan, A., Crişan, O., Nicula, C., Crişan, G. 2021. Chemical composition, diuretic, and antityrosinase activity of traditionally used Romanian *Cerasorum stipites*. Frontiers in Pharmacology, 12, 647947.

Babu, P., Anandh, V., Liu, D. (2009). Chapter 18 - Flavonoids and Cardiovascular Health." In: Ronald R. B. T. ed. Complementary and Alternative Therapies and the Aging Population. Watson, San Diego: Academic Press, 371–392. DOI: https://doi.org/10.1016/B978-0-12-374228-5.00018-4

Bahrin, A.A., Moshawih, S., Dhaliwal, J.S., Kanakal, M.M., Khan, A., Lee, K.S., Goh, B.H., Goh, H.P., Kifli, N., Ming, L.C. (2022). cancer protective effects of plums: a systematic review. Biomedicine and Pharmacotherapy, 146, 112568. DOI: https://doi.org/10.1016/j.biopha.2021.112568

Bansal, P. (2009). Effect of Traditionally Designed Nutraceutical on Stress Induced Immunoglobulin Changes at Antarctica. African Journal of Biochemistry Research, 3 (4), 084-088.

Barreca, D., Nabavi, S., Sureda, A., Rasekhian, M., Raciti, R., Sanches-Silva, A., Annunziata, G., Arnone, A., Tenore, G.C., Süntar, İ., Mandalari, G. (2020) Almonds (*Prunus dulcis* Mill. D. A. Webb): A source of nutrients and health-promoting compounds. Nutrients, 12 (3), 672. DOI: https://doi.org/10.3390/nu12030672

Bento, C., Gonçalves, A.C., Silva, B., Silva, L.R. (2020). Peach (*Prunus persica*): phytochemicals and health benefits. Food Reviews International, October, 1–32. DOI: https://doi.org/10.1080/87559129.2020.1837861

Bilali, H.El, Callenius, C., Strassner, C., Probst, L. (2018) Food and Nutrition Security and Sustainability Transitions in Food Systems, 8, e00154. DOI: https://doi.org/10.1002/fes3.154

Birwal, P., Deshmukh, G., Saurabh, S.P., Pragati S. (2017) Plums: a brief introduction. Journal of Food, Nutrition and Popular Health, 1, 1 (8), 1–5.

Brand-Miller, J., Foster-Powell, K., Nutr, M. (1999) Diets with a low glycemic index: from theory to practice. Nutrition Today, 34 (2), 64-72.

Bustamante, M., Muñoz, A., Romero, I., Osorio, P., Mánquez, S., Arriola, R., Reyes-Díaz, M., Ribera-Fonseca, A. (2021) Impact of potassium pre-harvest applications on fruit quality and condition of sweet cherry (*Prunus avium* L.) cultivated under plastic covers in southern Chile orchards. Plants, 10 (12), 2778. DOI: https://doi.org/10.3390/plants10122778

Celik, F., Gundogdu, M., Alp, Ş, Muradoğlu, F., Geçer, M., Canan, I. (2017) Determination of phenolic compounds, antioxidant capacity and organic acids contents of *Prunus domestica* L., *Prunus cerasifera* Ehrh. and *Prunus spinosa* L. fruits by HPLC. Acta Chromatographica, 29 (4), 507-510. DOI: https://doi.org/10.1556/1326.2017.00327

Chang, S. K., Alasalvar, C., Shahidi, F. (2016) Review of Dried Fruits: Phytochemicals, Antioxidant Efficacies, and Health Benefits. Journal of Functional Foods 21, 113–132. DOI: https://doi.org/10.1016/j.jff.2015.11.034

Clark, M., Macdiarmid, J., Jones, A. D., Ranganathan, J., Herrero, M., Fanzo, J. (2020) The Role of Healthy Diets in Environmentally Sustainable Food Systems. Food and Nutrition Bulletin, 41 (2), 31S-58S. DOI: https://doi.org/10.1177/0379572120953734

Cory, H., Passarelli, S., Szeto, J., Tamez, M., Mattei, J. (2018) The role of polyphenols in human health and food systems: A Mini-review. Frontiers in Nutrition, 5, 87. DOI: https://doi.org/10.3389/fnut.2018.00087

Díaz-Mula, H.M., Zapata, P.J., Guillén, F., Castillo, S., Martínez-Romero, D., Valero, D. Serrano, M. (2008) Changes in physicochemical and nutritive parameters and bioactive compounds during development and on-tree ripening of eight plum cultivars: a comparative study. Journal of the Science of Food and Agriculture, 88 (14), 2499–2507. DOI: https://doi.org/https://doi.org/10.1002/jsfa.3370.

Dunaevskaya, E.V., Gorina, V.M., Melkozerova, E.A., Khetagurov, Kh.M., Kozyrev, A.Kh. (2021) *Prunus cerasifera* Ehrh. fruits are a source of biologically active substances and high-quality feedstock for food for specific health use. E3S Web of Conferences, 282, 4008. DOI: https://doi.org/10.1051/e3sconf/202128204008

Dziadek, K., Kopeć, A., Czaplicki, S. (2018) The petioles and leaves of sweet cherry (*Prunus avium* L.) as a potential source of natural bioactive compounds. European Food Research and Technology, 244 (8), 1415–1426. DOI: https://doi.org/10.1007/s00217-018-3055-y

Fan, X., Jiao, W., Wang, X., Cao, J., Jiang, W. (2018) Polyphenol composition and antioxidant capacity in pulp and peel of apricot fruits of various varieties and maturity stages at harvest. International Journal of Food Science & Technology, 53 (2), 327–336. DOI: https://doi.org/https://doi.org/10.1111/ijfs.13589

Franklin, L.M., Mitchell, A.E. (2019) Review of the sensory and chemical characteristics of almond (*Prunus dulcis*) flavor. Journal of Agricultural and Food Chemistry, 67 (10), 2743–2753. DOI: https://doi.org/10.1021/acs.jafc.8b06606

Fratianni, F., d'Acierno A., Albanese, D., Matteo, M.D., Coppola, R., Nazzaro, F. (2022) Biochemical characterization of traditional varieties of apricots (*Prunus armeniaca* L.) of the Campania region, Southern Italy. Foods, 11 (1), 100. DOI: https://doi.org/10.3390/foods11010100

Fukuda, T., Ito, H., Mukainaka, T., Tokuda, H., Nishino, H., Yoshida, T. (2003) Anti-tumor promoting effect of glycosides from *Prunus persica* seeds. Biological & Pharmaceutical Bulletin, 26 (2), 271–273. DOI: https://doi.org/10.1248/bpb.26.271

García-Gómez, B. E., Salazar, J.A., Nicolás-Almansa, M., Razi, M., Rubio, M., Ruiz, D., Martínez-Gómez, P. (2021) Molecular bases of fruit quality in *Prunus* species: an integrated genomic, transcriptomic, and metabolic review with a breeding perspective. International Journal of Molecular Sciences, 22 (1), 333. DOI: https://doi.org/10.3390/ijms22010333

Gonçalves, A.C., Bento, C., Silva, B.M., Silva, L.R. (2017) sweet cherries from Fundão possess antidiabetic potential and protect human erythrocytes against oxidative damage. Food Research International, 95, 91–100. DOI: https://doi.org/10.1016/j.foodres.2017.02.023

Gonçalves, A.C., Flores-Félix, J.D., Costa, A.R., Falcão, A., Alves, G., Silva, L.R. 2021. Hepatoprotective effects of sweet cherry extracts (Cv. Saco). Foods, 10 (11), 2623. DOI: https://doi.org/10.3390/foods10112623

González-Gómez, D., Lozano, M., Fernández-León, M.F., Ayuso, M.C., Bernalte, M.J., Rodríguez, A.B. (2009) Detection and quantification of melatonin and serotonin in eight sweet cherry cultivars (*Prunus avium* L.). European Food Research and Technology, 229 (2), 223–229. DOI: https://doi.org/10.1007/s00217-009-1042-z

González-Gómez, D., Lozano, M., Fernández-León, M.F., Bernalte, M.J., Ayuso, M., Rodríguez, A.B. (2010) Sweet cherry phytochemicals: Identification and characterization by HPLC-DAD/ESI-MS in six sweet-cherry cultivars grown in Valle Del Jerte (Spain). Journal of Food Composition and Analysis, 23 (6), 533–539. DOI: https://doi.org/10.1016/j.jfca.2009.02.008

Google Scholar Database. https://scholar.google.com. [Accessed April 27, 2022].

Gündoğdu, M., Kan, T., Gecer, M.K. (2013) Vitamins, flavonoids, and phenolic acid levels in early- and late-ripening apricot (*Prunus armeniaca* L.) cultivars from Turkey. HortScience, 48 (6), 696–700. DOI: https://doi.org/10.21273/HORTSCI.48.6.696

Gunduz, K., Saraçoğlu, O. (2012) Variation in total phenolic content and antioxidant activity of *Prunus cerasifera* Ehrh. selections from mediterranean region of Turkey. Scientia Horticulturae, 134, 88–92. DOI: https://doi.org/10.1016/j.scienta.2011.11.003

Han, B., Bhagavathula, A.S., Rashid, M., Chhabra, M., Clark, C., Abdulazeem, H.M., Abd-ElGawad, M., Varkaneh, H.K., Rahmani, J., Zhang, Y. (2020). The Effect of sour cherry consumption on blood pressure, IL-6, CRP, and TNF-α levels: a systematic review and meta-analysis of randomized controlled trials sour cherry consumption and blood pressure. Journal of King Saud University – Science, 32 (2), 1687-1693. DOI: https://doi.org/10.1016/j.jksus.2020.01.002

Hever, J., Cronise, R.J. (2017) Plant-based nutrition for healthcare professionals: implementing diet as a primary modality in the prevention and treatment of chronic disease. Journal of Geriatric Cardiology, 14 (5), 355-368. DOI: https://doi.org/10.11909/j.issn.1671-5411.2017.05.012

Hooper, L., Kay, C., Abdelhamid, A., Kroon, P.A., Cohn, J.S., Rimm, E.B., Cassidy, A. (2012) Effects of chocolate, cocoa, and flavan-3-ols on cardiovascular health: a systematic review and meta-analysis of randomized trials. The American Journal of Clinical Nutrition, 95 (3), 740-751. DOI: https://doi.org/10.3945/ajcn.111.023457

Hu, T., Subbiah, V., Wu, H., BK, A., Rauf, A., Alhumaydhi, F. A., Suleria, H.A.R. (2021) Determination and characterization of phenolic compounds from Australia-grown sweet cherries (*Prunus avium* L.) and their potential antioxidant properties. American Chemical Society Omega, 6 (50), 34687-34699. DOI: https://doi.org/10.1021/acsomega.1c05112

Igwe, E.O, Charlton, K.E. (2016) A systematic review on the health effects of plums (*Prunus domestica* and *Prunus salicina*). Phytotherapy Research, 30 (5), 701-731. DOI: https://doi.org/10.1002/ptr.5581

Jabeen, A., Baig, M.T., Shaikh, S., Alam, N., Kashif, S., Shahnaz, S., Vengus, P., Soomro, H., Shahid, U. (2019) *In Vivo* Study on Laxative Effect of *Prunus Amygdalus* Oil. International Journal of Medical Research & Health Sciences, 8(3), 121-125.

Jaceldo-Siegl, K., Sabaté, J., Rajaram, S., Fraser, G.E. (2004) Long-term almond supplementation without advice on food replacement induces favourable nutrient modifications to the habitual diets of free-living individuals. British Journal of Nutrition, 92 (3), 533-540. DOI: https://doi.org/10.1079/BJN20041223

Jaffri, S.B., Ahmad, K.S. (2018) *Prunus cerasifera* Ehrh. fabricated ZnO nano falcates and its photocatalytic and dose dependent *in vitro* bio-activity. Open Chemistry, 16 (1), 141-154. DOI: https://doi.org/10.1515/chem-2018-0022

Ji, J., Yang, X., Flavel, M., Shields, Zenaida. P.-I., Kitchen, B. (2019) Antioxidant and anti-diabetic functions of a polyphenol-rich sugarcane extract. Journal of the American College of Nutrition, 38 (8), 670-680. DOI: https://doi.org/10.1080/07315724.2019.1587323

Jimenez-Lopez, C., Fraga-Corral, M., Carpena, M., García-Oliveira, P., Echave, J., Pereira, A.G., Lourenço-Lopes, C., Prieto, M.A., Simal-Gandara, J. (2020) agriculture waste valorisation as a source of antioxidant phenolic compounds within a circular and sustainable bioeconomy. Food & Function, 11 (6), 4853-4877. DOI: https://doi.org/10.1039/D0FO00937G

Karabulut, I., Ozdemir, I.S., Koc, T.B., Sislioglu, K., Gokbulut, K., Saritepe, Y. (2021) Changes in compositional properties during fruit development and on-tree ripening of two common apricot (*Prunus armeniaca* L.) cultivars. Chemistry & Biodiversity, 18 (8), e2100286. DOI: https://doi.org/10.1002/cbdv.202100286

Kasote, D.M. Katyare, S.S., Hegde, M.V., Bae, H. (2015) Significance of antioxidant potential of plants and its relevance to therapeutic applications. International Journal of Biological Sciences, 11 (8), 982-891. DOI: https://doi.org/10.7150/ijbs.12096

Kayano, S.-I., Kikuzaki, H., Fukutsuka, N., Mitani, T., Nakatani, N. (2002) Antioxidant activity of prune (*Prunus domestica* L.) constituents and a new synergist. Journal of Agricultural and Food Chemistry, 50 (13), 3708-3712. DOI: https://doi.org/10.1021/jf0200164

Keser, S., Demir, E., Yilmaz, O. (2014) Phytochemicals and antioxidant activity of the almond kernel (*Prunus dulcis* Mill.) from Turkey. Journal of the Chemical Society of Pakistan, 36 (3), 534-541.

Kikuzaki, H., Kayano, S., Fukutsuka, N., Aoki, A., Kasamatsu, K., Yamasaki, Y., Mitani, T., Nakatani, N. (2004) Abscisic acid related compounds and lignans in prunes (*Prunus domestica* L.) and their oxygen radical absorbance capacity (ORAC). Journal of Agricultural and Food Chemistry, 52 (2), 344-349. DOI: https://doi.org/10.1021/jf034954v

Kim, D.-W., Jung, D.-H., Sung, J., Min, I.S., Lee, S.-J. (2021) Tart cherry extract containing chlorogenic acid, quercetin, and kaempferol inhibits the mitochondrial apoptotic cell death elicited by airborne pm(10) in human epidermal keratinocytes. Antioxidants,10 (3), 443. DOI: https://doi.org/10.3390/antiox10030443

Kjøllesdal, M., Htet, A.S., Stigum, H., Hla, N.Y., Hlaing, H.H., Khaine, E.K., Khaing, W., Khant, A.K., Khin, N., Mauk, K., Moe, E., Moe, H., Mon, K., Mya, K.S., Myint, C., Myint, C., Myint, M., Myint, O., New, A., Bjertness, E. (2016) Consumption of fruits and vegetables and associations with risk factors for non-communicable diseases in the Yangon region of Myanmar: a cross-sectional study. BMJ Open, 6 (8), e011649. DOI: https://doi.org/10.1136/bmjopen-2016-011649

Kopčeková, J., Kolesárová, A., Schwarzová, M., Kováčik, A., Mrázová, J., Gažarová, M., Lenártová, P., Chlebo, P., Kolesárová, A. (2022) Phytonutrients of bitter apricot seeds modulate human lipid profile and LDL subfractions in adults with elevated cholesterol levels. International Journal of Environmental Research and Public Health, 19 (2), 857. DOI: https://doi.org/10.3390/ijerph19020857

Kristl, J., Slekovec, M., Tojnko, S., Unuk, T. (2011) Extractable antioxidants and non-extractable phenolics in the total antioxidant activity of selected plum cultivars (*Prunus domestica* L.): evolution during on-tree ripening. Food Chemistry, 125 (1), 29-34. DOI: http://dx.doi.org/10.1016/j.foodchem.2010.08.027

Kuhnle, G.G.C., Dell'Aquila, C., Aspinall, S.M., Runswick, S.A., Mulligan, A.A., Bingham, S.A. (2008) Phytoestrogen content of beverages, nuts, seeds, and oils. Journal of Agricultural and Food Chemistry, 56 (16), 7311-7315. DOI: https://doi.org/10.1021/jf801534g

Kurus, M., Ugras, M., Ates, B., Otlu, A. (2009) Apricot ameliorates alcohol induced testicular damage in rat model. Food and Chemical Toxicology : An International Journal Published for the British Industrial Biological Research Association, 47 (10), 2666-2672. DOI: https://doi.org/10.1016/j.fct.2009.07.034

Lachkar, A., Attia, I. B., Amor, Y. (2020) Morphological and chemical analysis of peach fruits in three different farming systems. Organic Agriculture, 10 (1), 49-61. DOI: https://doi.org/10.1007/s13165-019-00250-w

Lagnika, L., Amoussa, A.M., Adjileye, R., Laleye, A., Sanni, A. (2016) Antimicrobial, antioxidant, toxicity and phytochemical assessment of extracts from *Acmella uliginosa*, a leafy-vegetable consumed in Bénin, West Africa. BMC Complementary and Alternative Medicine, 16, 34. DOI: https://doi.org/10.1186/s12906-016-1014-3

Liaudanskas, M., Okulevičiūtė, R., Lanauskas, J., Kviklys, D., Zymonė, K., Rendyuk, T., Žvikas, T., Uselis, N., Janulis, V. (2020) Variability in the content of phenolic compounds in plum fruit. Plants, 9 (11), 1611. DOI: https://doi.org/10.3390/plants9111611

Liu, R. H. (2013) Health-Promoting Components of Fruits and Vegetables in the Diet. Advances in Nutrition, 4 (3), 384S-392S. DOI: https://doi.org/10.3945/an.112.003517

Liu, Y.-Jian., Zhan, J., Liu, X.-L., Wang, Y., Ji, J., He, Q.-Q. (2014) Dietary Flavonoids Intake and Risk of Type 2 Diabetes: a meta-analysis of prospective cohort studies. Clinical Nutrition, 33 (1), 59-63. DOI: https://doi.org/10.1016/j.clnu.2013.03.011

Lombardi-Boccia, G., Lucarini, M., Lanzi, S., Aguzzi, A., Cappelloni, M. (2004) Nutrients and antioxidant molecules in yellow plums (*Prunus domestica* L.) from conventional and organic productions: a comparative study. Journal of Agricultural and Food Chemistry, 52 (1), 90-94. DOI: https://doi.org/10.1021/jf0344690

Lordanescu, O., Alexa, E., Lalescu, D., Berbecea, A., Camen, D., Poiana, M.A., Moigradean, D., Bala, M. (2018) Chemical composition and antioxidant activity of some apricot varieties at different ripening Stages. Chilean Journal of Agricultural Research, 78 (2), 266-275. DOI: http://dx.doi.org/10.4067/S0718-58392018000200266

Lynn, A., Mathew, S., Moore, C. T., Russell, J., Robinson, E., Soumpasi, V., Barker, M. E. (2014) Effect of a tart cherry juice supplement on arterial stiffness and inflammation in healthy adults: a randomised controlled trial. Plant Foods for Human Nutrition, 69 (2), 122-127. DOI: https://doi.org/10.1007/s11130-014-0409-x

Mayta-Apaza, A., Pottgen, E., De Bodt, J., Papp, N., Marasini, D., Howard, L., Abranko, L., Van de Wiele, T., Lee, S.-O., Carbonero, F. (2018) Impact of tart cherries polyphenols on the human gut microbiota and phenolic metabolites *in vitro* and *in vivo*. The Journal of Nutritional Biochemistry, 59, 160-172. DOI: https://doi.org/https://doi.org/10.1016/j.jnutbio.2018.04.001

McCune, L., Kubota, C., Stendell-Hollis, N., Thomson, C. (2011) Cherries and health: a review. Critical Reviews in Food Science and Nutrition, 51 (1), 1-12. DOI: https://doi.org/10.1080/10408390903001719

Mihaylova, D., Desseva, I., Popova, A., Dincheva, I., Vrancheva, R., Lante, A., Krastanov, A. (2021a). GC-MS metabolic profile and α-glucosidase-, α-amylase-, lipase-, and acetylcholinesterase-inhibitory activities of eight peach varieties. Molecules, 26 (14), 4183. DOI: https://doi.org/10.3390/MOLECULES26144183

Mihaylova, D., Popova, A., Desseva, I., Petkova, N., Stoyanova, M., Vrancheva, R., Slavov, A., Slavchev, A., Lante A. (2021b). Comparative study of early- and mid-ripening peach (*Prunus persica* L.) varieties: Biological activity, macro-, and micro- nutrient profile. Foods, 10 (1), 164. DOI: https://doi.org/10.3390/foods10010164

Mihaylova, D., Popova, A., Vrancheva, R., Dincheva, I. (2022) HS-SPME-GC- MS volatile profile characterization of peach (*Prunus persica* L. Batsch) varieties grown in the Eastern Balkan peninsula. Plants, 11 (2), 166. DOI: https://doi.org/10.3390/plants11020166

Miletic, N., Popović, B., Mitrović, O., Kandić, M. (2012) Phenolic content and antioxidant capacity of fruits of plum cv. 'Stanley' (*Prunus domestica* L.) as influenced by maturity stage and on-tree ripening. Australian Journal of Crop Science, 6 (4), 681-687.

Mir, A., Yaqoob, U., Hassan, M., Bashir, F., Bin Zanit, S., Haq, S., Bussmann, R. (2021) Ethnopharmacology and phenology of high-altitude medicinal plants in Kashmir, Northern Himalaya. Ethnobotany Research and Applications, 22, 1-15. Available at: https://ethnobotanyjournal.org/index.php/era/article/view/2963

Moreno Gracia, B., Laya Reig, D., Rubio-Cabetas, M., Sanz García, M. (2021) Study of phenolic compounds and antioxidant capacity of spanish almonds. Foods, 10 (10), 2334.
DOI: https://doi.org/10.3390/foods10102334

Moynihan, P., Kelly, S. (2014) Effect on caries of restricting sugars intake: systematic review to inform WHO guidelines. Journal of Dental Research, 93 (1), 8-18.
DOI: https://doi.org/10.1177/0022034513508954

Nunes, A., Gonçalves, A., Alves, G., Falcão, A., Garcia-Viguera, C., Moreno, D., Silva, L. (2021) Valorisation of *Prunus avium* L. by-products: phenolic composition and effect on caco-2 cells viability. Foods, 10 (6), 1185. DOI: https://doi.org/10.3390/foods10061185

Office for Health Improvement and Disparities, Department of Health and Social Care, NHS England. (2017) Delivering better oral health: an evidence-based toolkit for prevention. Public Health England. Available at: https://www.gov.uk/government/publications/delivering-better-oral-health-an-evidence-based-toolkit-for-prevention [Accessed April 7, 2022].

Oliveira, A., Pintado, M., Almeida, D. (2012) Phytochemical composition and antioxidant activity of peach as affected by pasteurization and storage duration. LWT-Food Science and Technology, 49 (2), 202-207.
DOI: https://doi.org/https://doi.org/10.1016/j.lwt.2012.07.008

Oliveira, I., Meyer, A., Afonso, S., Sequeira, A., Vilela, A., Goufo, P., Trindade, H., Gonçalves, B. (2020) Effects of different processing treatments on almond (*Prunus dulcis*) bioactive compounds, antioxidant activities, fatty acids, and sensorial characteristics. Plants, 9 (11), 1627. DOI: https://doi.org/10.3390/plants9111627

Pacifico, S., Di Maro, A., Petriccione, M., Galasso, S., Piccolella, S., Di Giuseppe A., Scortichini, M., Monaco, P. (2014) Chemical composition, nutritional value and antioxidant properties of autochthonous *Prunus avium* cultivars from Campania Region. Food Research International, 64 (10), 188-199.
DOI: https://doi.org/10.1016/j.foodres.2014.06.020

Patra, A. (2012) Dietary phytochemicals and microbes. Springer Science+Business Media Dordrecht.
DOI: https://doi.org/10.1007/978-94-007-3926-0

Phung, O., Makanji, S., White, M., Coleman, C. (2009) Almonds have a neutral effect on serum lipid profiles: A meta-analysis of randomized trials. Journal of the American Dietetic Association, 109 (5), 865-873. DOI: https://doi.org/10.1016/j.jada.2009.02.014

Pino, J., Quijano, C. (2012) Study of the volatile compounds from plum (*Prunus domestica* L. Cv. Horvin) and estimation of their contribution to the fruit aroma. Food Science and Technology (Campinas), 32 (3), 76-83.
DOI: https://doi.org/10.1590/S0101-20612012005000006

Poonam, V., Kumar, G., Reddy, S., Jain, R., Sharma, S., Prasad, A., Parmar S. (2011) Chemical constituents of the genus *Prunus* and their medicinal properties. Current Medicinal Chemistry, 18 (25), 3758-3824. DOI: https://doi.org/10.2174/092986711803414386

Puri, A., Sahai, R., Singh, K., Saxena, R., Tandon, J., Saxena, K. (2000) Immunostimulant activity of dry fruits and plant materials used in Indian traditional medical system for mothers after child birth and invalids. Journal of Ethnopharmacology, 71 (1), 89-92.
DOI: https://doi.org/10.1016/S0378-8741(99)00181-6

Putkaradze, J., Diasamidze, M., Vanidze, M., Kalandia, A. (2021) Antioxidant activity of *Prunus cerasifera* products. International Journal of Life Sciences, 10 (3), 52-54.

Raafat, K., El-Darra, N., Saleh, F. (2020) Gastroprotective and anti-inflammatory effects of *Prunus cerasus* phytochemicals and their possible mechanisms of action. Journal of Traditional and Complementary Medicine, 10 (4), 345-353.
DOI: https://doi.org/10.1016/j.jtcme.2019.06.001

Rao, H., Lakshmi, C. (2012) Therapeutic applications of almonds (*Prunus amygdalus* L.): a review. Journal of Clinical and Diagnostic Research, 6 (1), 130-135.

Raynal, J., Moutounet, M., Souquet, J. (1989) Intervention of phenolic compounds in plum technology. 1. Changes during drying. Journal of Agricultural and Food Chemistry, 37 (4), 1046-1050.
DOI: https://doi.org/10.1021/jf00088a050

Redondo, D., Arias, E., Oria, R., Venturini, M. (2017) Thinned stone fruits are a source of polyphenols and antioxidant compounds. Journal of the Science of Food and Agriculture, 97, 902-910.
DOI: https://doi.org/10.1002/jsfa.7813

Ricci, A., Sabbadini, S., Prieto, H., Padilla, I., Dardick, C., Li, Z., Scorza, R., Limera, C., Mezzetti, B., Perez-Jimenez, M., Burgos, L., Petri, C. (2020) Genetic transformation in peach (*Prunus persica* L.): challenges and ways forward. Plants, 9 (8), 971.
DOI: https://doi.org/10.3390/plants9080971

Roussos, P., Sefferou, V., Denaxa, N., Eleni Tsantili, E., Stathis, V. (2011) Apricot (*Prunus armeniaca* L.) fruit quality attributes and phytochemicals under different crop load. Scientia Horticulturae, 129 (3), 472-478. DOI: https://doi.org/10.1016/j.scienta.2011.04.021

Ruiz, D., Egea, J., Tomás-Barberán, F., Gil, M. (2005) Carotenoids from new apricot (*Prunus armeniaca* L.) varieties and their relationship with flesh and skin color. Journal of Agricultural and Food Chemistry, 53 (16), 6368-6374. DOI: https://doi.org/10.1021/jf0480703

Sabou, V., O'Leary, M., Liu, Y., Brown, P., Murch, S., Bowtell, J. (2021) Review of analytical methods and reporting of the polyphenol content of tart cherry supplements in human supplementation studies investigating health and exercise performance effects: Recommendations for good practice. Frontiers in Nutrition, 8, 652094. DOI: https://doi.org/10.3389/fnut.2021.652094

Sadler, M., Gibson, S., Whelan, K., Ha, M., Lovegrove, J., Higgs, J. (2019) Dried fruit and public health – What does the evidence tell us? International Journal of Food Sciences and Nutrition, 70 (6), 675-687. DOI: https://doi.org/10.1080/09637486.2019.1568398

Schmitz-Eiberger, M., Blanke, M. (2012) Bioactive components in forced sweet cherry fruit (*Prunus avium* L.), antioxidative capacity and allergenic potential as dependent on cultivation under cover. LWT - Food Science and Technology, 46 (2), 388-392. DOI: https://doi.org/10.1016%2Fj.lwt.2011.12.015

Schreiner, M., Huyskens-Keil, S. (2006) Phytochemicals in fruit and vegetables: health promotion and postharvest elicitors. Critical Reviews in Plant Sciences, 25 (3), 267-278. DOI: https://doi.org/10.1080/07352680600671661

Scopus Database. https://www.scopus.com. [Accessed April 27, 2022].

Seo, K., Choi, S., Jin, Y., Son, H., Kang, Y., Jung, S., Kim, Y., Eum, S., Bach, T. T., Yoo, H., Whang, W., Jung, S., Kang, W., Ko, H., Lee, S. (2020) Anti-inflammatory role of *Prunus persica* L. Batsch methanol extract on lipopolysaccharide-stimulated glial cells. Molecular Medicine Reports, 21(5), 2030-2040. DOI: https://doi.org/10.3892/mmr.2020.11016

Serra, A., Matias, A., Almeida, A., Bronze, M., Alves, P., de Sousa, H., Duarte, C. (2011) Processing cherries (*Prunus avium*) using supercritical fluid technology. part 2. Evaluation of SCF extracts as promising natural chemotherapeutical agents. The Journal of Supercritical Fluids, 55 (3), 1007-1013. DOI: https://doi.org/10.1016/j.supflu.2010.06.006

Serra, S., Anthony, B., Masia, A., Giovannini, D., Musacchi, S. (2020) Determination of biochemical composition in peach (*Prunus persica* L. Batsch) accessions characterized by different flesh color and textural typologies. Foods, 9 (10), 1452. DOI: https://doi.org/10.3390/foods9101452

Shah, K., Patel, J., Shrma, V., Shrma, R., Patel, R., Chaunhan, U. (2011) Evaluation of antidiabetic activity of *Prunus amygdalus* Batsch in streptozotocin induced diabetic mice. The Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2, 429-434.

Sharma, S., Satpathy, G., Gupta, R. (2014) Nutritional, phytochemical, antioxidant and antimicrobial activity of *Prunus armenicus*. Journal of Pharmacognosy and Phytochemistry, 3 (3), 23-28.

Siddiqui, R. (2017) Plums as potential dietary agents to prevent obesity and obesity-related disorders. Journal of Obesity and Therapeutics, 1 (1).

Silva Linge, C., Cai, L., Fu, W., Clark, J., Worthington, M., Rawandoozi, Z., Byrne, D., Gasic, K. (2021) Multi-locus genome-wide association studies reveal fruit quality hotspots in peach genome. Frontiers in Plant Science, 12, 644799. DOI: https://doi.org/10.3389/fpls.2021.644799

Sokół-Łętowska, A., Kucharska, A., Hodun, G., Gołba, M. (2020) Chemical composition of 21 cultivars of sour cherry (*Prunus cerasus*) fruit cultivated in Poland. Molecules, 25 (19), 4587. DOI: https://doi.org/10.3390/molecules25194587

Song, W., Qin, S.T., Fang, F., Gao, Z., Liang, D., Liu, L., Tian, H., Yang, H. (2018) Isolation and purification of condensed tannin from the leaves and branches of *Prunus cerasifera* and its structure and bioactivities. Applied Biochemistry and Biotechnology, 185, 464-475. DOI: https://doi.org/10.1007/s12010-017-2635-9

Spiller, G., Jenkins, D., Bosello, O., Gates, J., Cragen, L., Bruce, B. (1998) Nuts and plasma lipids: an almond-based diet lowers LDL-C while preserving HDL-C. Journal of the American College of Nutrition, 17 (3), 285-290. DOI: https://doi.org/10.1080/07315724.1998.10718761

Stefanut, M., Cata, A., Ienascu, I. (2015) Comparative antioxidant activity of some *Prunus genus* fruits. Revue Roumaine de Chimie, 60 (5-6), 603-608.

Suh, S., Koo, B., Jin, U., Hwang, M., Lee, I., Kim, C. (2006) Pharmacological characterization of orally active cholinesterase inhibitory activity of *Prunus persica* L. Batsch in rats. Journal of Molecular Neuroscience, 29 (2), 101-107. DOI: https://doi.org/10.1385/JMN:29:2:101

Szwajgier, D., Kamila Borowiec, K., Zapp, J. (2020) Activity-guided isolation of cholinesterase inhibitors quercetin, rutin and kaempferol from *Prunus persica* fruit. Zeitschrift Fur Naturforschung. C, Journal of Biosciences, 75 (3-4), 87-96. DOI: https://doi.org/10.1515/znc-2019-0079

Tang, Z., Li, M., Zhang, X., Hou, W. (2016) Dietary flavonoid intake and the risk of stroke: a dose-response meta-analysis of prospective cohort studies. BMJ Open, 6 (6), e008680. DOI: https://doi.org/10.1136/bmjopen-2015-008680

Tomić, J., Štampar, F., Glišić, I., Jakopič, J. (2019) Phytochemical assessment of plum (*Prunus domestica* L.) cultivars selected in Serbia. Food Chemistry, 299 (11), 125113. DOI: https://doi.org/10.1016/j.foodchem.2019.125113

Usenik, V., Fajt, N., Mikulic-Petkovsek, M., Slatnar, A., Stampar, F., Veberic, R. (2010) Sweet cherry pomological and biochemical characteristics influenced by rootstock. Journal of Agricultural and Food Chemistry, 58 (8), 4928-4933. DOI: https://doi.org/10.1021/jf903755b

Usenik, V., Štampar, F., Veberič, R. (2009) Anthocyanins and fruit colour in plums (*Prunus domestica* L.) during ripening. Food Chemistry, 114 (2), 529–534. DOI: https://doi.org/https://doi.org/10.1016/j.foodchem.2008.09.083

Valdés, A., Beltrán, A., Karabagias, I., Badeka, A., Michael G Kontominas, M., Garrigós, M. (2015) Monitoring the oxidative stability and volatiles in blanched, roasted and fried almonds under normal and accelerated storage conditions by DSC, thermogravimetric analysis and ATR-FTIR. European Journal of Lipid Science and Technology, 117, 1199–1213. DOI: https://doi.org/10.1002/ejlt.201400384

Vargas, A., de Moura, A., Deliza, R., Cunha, L. (2021) The role of local seasonal foods in enhancing sustainable food consumption: A Systematic literature review. Foods, 10 (9), 2206. DOI: https://doi.org/10.3390/foods10092206

Veerappan, K., Natarajan, S., Chung, H., Park, J. (2021) Molecular insights of fruit quality traits in peaches, *Prunus persica*. Plants, 10 (10), 2191. DOI: https://doi.org/10.3390/plants10102191

Vega-Gálvez, A., Quispe-Fuentes, I., Uribe, E., Martinez-Monzo, J., Pasten A., Lemus-Mondaca, R. (2019) Bioactive compounds and physicochemical characterization of dried apricot (*Prunus armeniaca* L.) as affected by different drying temperatures. CyTA - Journal of Food, 17 (1), 297-306. DOI: https://doi.org/10.1080/19476337.2019.1577918

Villavicencio, J., Zoffoli, J., Plotto, A., Contreras, C. (2021) Aroma compounds are responsible for an herbaceous off-flavor in the sweet cherry (*Prunus avium* L.) Cv. Regina during fruit development. Agronomy, 11 (10), 2020. DOI: https://doi.org/10.3390/agronomy11102020

Vizzotto, M., Cisneros-Zevallos, L., Byrne, D., Ramming, D., Okie, W. (2007) Large variation found in the phytochemical and antioxidant activity of peach and plum germplasm. Journal of the American Society for Horticultural Science, 132 (3), 334-340. DOI: https://doi.org/10.21273/JASHS.132.3.334

Walkowiak-Tomczak, D. (2008) Characteristics of plums as a raw material with valuable nutritive and dietary properties-a Review. Polish Journal of Food and Nutrition Sciences, 58 (4), 401-405.

Wallace, T. (2017) Dried plums, prunes and bone health: A Comprehensive Review. Nutrients, 9(4). DOI: https://doi.org/10.3390/nu9040401

Wang, Y., Chen, X., Zhang, Y., Chen, X. (2012) Antioxidant activities and major anthocyanins of myrobalan plum (*Prunus cerasifera* Ehrh.). Journal of Food Science, 77 (4), 388-393. DOI: https://doi.org/10.1111/j.1750-3841.2012.02624.x

Web of Science Databases. https://www.webofscience.com. [Accessed April 27, 2022].

Wojdyło, A., Nowicka, P. (2021) Profile of phenolic compounds of *Prunus armeniaca* L. leaf extract determined by LC-ESI-QTOF-MS/MS and their antioxidant, anti-diabetic, anti-cholinesterase, and anti-inflammatory potency. Antioxidants, 10 (12), 1869. DOI: https://doi.org/10.3390/antiox10121869

Wojdyło, A., Nowicka, P., Laskowski, P., Oszmiański, J. (2014) Evaluation of sour cherry (*Prunus cerasus* L.) fruits for their polyphenol content, antioxidant properties, and nutritional components. Journal of Agricultural and Food Chemistry, 62 (51), 12332-12345. DOI: https://doi.org/10.1021/jf504023z

Yada, S., Huang, G., Lapsley, K. (2011) A review of composition studies of cultivated almonds: macronutrients and micronutrients. Journal of Food Composition and Analysis, 24 (4-5), 469-480. DOI: https://doi.org/10.1016/j.jfca.2011.01.007

Yada, S., Huang, G., Lapsley, K. (2013) Natural variability in the nutrient composition of california-grown almonds. Journal of Food Composition and Analysis, 30 (2), 80-85. DOI: https://doi.org/10.1016/j.jfca.2013.01.008

Yiğit, D., Yiğit, N., Mavi, A. (2009) Antioxidant and antimicrobial activities of bitter and sweet apricot (*Prunus armeniaca* L.) kernels. Brazilian Journal of Medical and Biological Research, 42 (4), 346-352. DOI: https://doi.org/10.1590/s0100-879x2009000400006

Yiğit, D., Baydaş, E., Güleryüz, M. (2009) Elemental analysis of various cherry fruits by wavelength dispersive x-ray fluorescence spectrometry. Asian Journal of Chemistry, 21 (4), 2935-2942.

Zhang, H., Liu, W., Fang, J., Chen, S., Liu, Y., Wu, B., Li, S. (2014) Volatile profiles of apricot cultivars (*Prunus armeniaca* Lam.) evaluated by head space solid phase microextraction gas chromatography mass spectrometry. Analytical Letters, 47 (3), 433-452. DOI: https://doi.org/10.1080/00032719.2013.843184

Zhou, W., Niu, Y., Ding, X., Zhao, S., Li, Y., Fan, G., Zhang, S., Liao, K. (2020) Analysis of carotenoid content and diversity in apricots (*Prunus armeniaca* L.) grown in China. Food Chemistry, 330, 127223. DOI: https://doi.org/10.1016/j.foodchem.2020.127223