MARITIME PINE

Pinus pinaster Aiton

Family

Pinaceae, the pine family.

Parts Used

Bark.

Description

A native of the Mediterranean region, maritime pine is an evergreen perennial, coniferous tree with dark reddish brown, deeply fissured bark. This fast growing, tall tree (up to 40 metres) has spirally arranged branches and dark green leaves, (or needles) which are mostly 10 to 25 centimetres long with a 2.5cm long leaf sheath. The cones, often collected as ornaments, are 10 to 20 centimetres long and usually remain unopened for some years.

Maritime pine trees are often planted as windbreaks and ornamental trees. In the southern hemisphere, where maritime pine has been introduced for environmental and economical purposes, it is considered a highly invasive species.[1,2]

For more than a decade The Herbal Extract Company, in consultation with the Forestry Corporation of NSW, have been personally wild crafting maritime pine bark from chemical free land in the Central West region. An intoxicating pine aroma pervades the air on approach to the distinct stand of trees which is less than four hours' drive from our manufacturing facility. Once a tree has been felled the outer bark is carefully removed providing an exceptionally fresh, and potent, raw material full of vitality. The bark is then naturally sun dried until it is ready for milling to a fine grade to allow maximum surface contact area for optimal

extraction. Timber from NSW State forests is certified sustainable, meaning consumers can be assured that the timber is coming from forests that are managed to internationally recognised sustainability standards.

Traditional Use

Pine bark extracts have been used traditionally to treat wounds and date back at least to Hippocrates (inflammation) around 400BC. Maritime pine bark has been used for the extraction of resin obtaining turpentine and rosin (resin) both used in a wide range of products including oils, varnishes, adhesives, waxes, soaps and medicines. Its stands are also an ideal ecosystem for the development of edible fungi such as mushrooms of the genus *Boletus* (porcini and morels) and *Lactarius* (milk caps).[3,4,5]

Maritime pine bark can be used in a similar way to the traditionally used resin and needles which increase expectoration and supports the immune system. Per gram pine needles have more vitamin C than an orange. They can be helpful during a cold or influenza virus for thinning congested mucus in the lungs and sinuses. They are also soothing to a sore throat. A decoction of the bark of maritime pine is considered to be stronger than the needles and was historically used for lung infections. The cambium (the part of a tree that produces new bark, below the outer and inner bark, and above the sapwood and heartwood) was commonly eaten as a famine food by various First Nations peoples.[6]

One of the first documented uses of indigenous medicine in North America was in the frigid winter of 1536 with the cure of French explorer Jacques Cartier's critically ill crew from scurvy, a severe deficiency of Vitamin C. Cartier's second voyage (1535 to 1536) was undertaken at the command of King Francois to complete the discovery of the western lands under the same climate and parallels as in France. By February 1536, of the 110 crew members on all three ships, eight were already dead and more than 50 past all hope of recovery. The scurvy continued to spread until only three healthy men remained on the ships. At Stadaconna, now Quebec City, Cartier's crew was cured of scurvy by ascorbic acid (vitamin C) obtained as a decoction from the native American Indian tribe, the Iroquois. It was prepared by boiling winter leaves and the bark from an evergreen tree.[7]

Cartier had met an Iroquois called Domagaia who said he had taken the juice and sap of the leaves of a certain tree to heal himself from the same disease. Domagaia showed Cartier how to make the decoction and also recommended the "dregs" be put on the legs of the sick (which were black and swollen). The author of a book called "The Voyages of Jacques Cartier" translates: "The Captain at once ordered a drink to be prepared for the sick men but none of them would taste it. At length one or two thought they would risk a trial. As soon as they had drunk it they felt better, which must clearly be ascribed to miraculous causes; for after drinking it two or three times they recovered health and strength and were cured of all the diseases they had ever had. And some of the sailors who had been suffering for five or six years from the French pox [syphilis] were by this medicine cured completely. When this became known, there was such a press for the medicine that they almost killed each other to have it first; so that in less than eight days a whole tree as large and as tall as any I ever saw was used up, and produced such a result that had all the doctors of Louvain and Montpellier been there, with all the drugs of Alexandria, they could not have done so much in a year as did this tree in eight days; for it benefitted us so much that all who were willing to use it recovered health and strength, thanks be to God." [8]

The true identity of the tree became controversial and several conifers have been considered as candidates for the source of this cure. There are still conflicting reports as to what it was. Some sources say it could have been *Thuja occidentalis* (thuja), *Juniperus communis* (juniper) or *Pinus strobus* (eastern white pine) among others.[9,10]

Nevertheless four centuries later during a sabbatical at the University of Quebec Professor Jacques Masquelier, of the University of Bordeaux in France, heard about Cartier's account and this turned his attention to the antioxidant proanthocyanidins of conifer bark. He was investigating a group of substances called flavanols which he originally found in peanut skins. Flavanols and bioflavonoids are substances in fruits and vegetables that give them their colour. Masquelier found that these

substances have beneficial effects in the body particularly in improving circulation and repairing tissue.[11]

Maritime pine is found around Masquelier's home region Bordeaux, especially the Les Landes de Gascogne forest, so when he went for a walk one day he took a piece of bark from a tree and was struck by the fact that it was dark brown-red on the outside but light brown-yellow on the inside which reminded him of peanut skin. In the peanut the bioactive part containing the oligomeric proanthocyanidin complexes (OPCs) is located in the inner lining of the "wrapping," where the skin is in contact with the nut. Masquelier and his colleagues came to regard the pine bark as a huge peanut skin and found that an abundant source of these substances was also in the bark of the pine trees that grew on these coasts of southern France.[12]

Masquelier referred to proanthocyanidins as pycnogenols. The name comes from pycno - to thicken or condense, gen - to generate and ol - a suffix used to form the names of chemical compounds having a hydroxyl group, such as polyphenol. This term was used to describe an entire group of procyanidin complexes found in a variety of plants including pine bark, grape seed, lemon tree bark, peanuts, cranberries and citrus peel. The term pycnogenols is now considered obsolete in the scientific community to describe these compounds giving way to the terms procyanadins, OPCs and/or procyanidolic oligomers (PCOs).[13]

Pycnogenol is now a patented trade name, the registered trademark of Horphag Research, for a water extract of the PCO of bark of the maritime pine commonly grown in the coastal southwest of France *(Pinus pinaster* ssp. *atlantica)*. Masquelier patented the method of extracting PCO from pine bark in France in 1951 and from grape seed in 1970. Pycnogenol® is based on unique and proprietary extraction technology yielding a combination with constant proportions of procyanidins, bioflavonoids and organic acids. It has been introduced into 80 countries, with more than 420 scientific publications written about it, and more than 1000 products worldwide. Research suggests significant antioxidant activity for Pycnogenol based primarily on its procyanidin content.[14,15,16]

Constituents

Bioflavonoids, predominantly oligomeric proanthocyanidins (OPCs) a rich source of natural polyphenols (tannins), aromatic compounds, resin and fatty acids, fatty alcohols, sterols. OPCs in nutritional supplements are generally extracted from pine bark or grape seeds. The ability of OPCs to complex proteins is referred to as astringency and is responsible for the "puckery" sensation when tea, red wine or maritime pine bark extract comes in contact with saliva and the inner lining of the cheeks and lips.[17,18]

A book, which took 20 years to compile, called "OPCs, Dr. Jack Masquelier's Mark on Health" was written by Bert Schwitters in close and direct contact and cooperation with Masquelier. Schwitters says that when companies use the term "OPC" in their communication this opens the door to "borrowing" the scientific results obtained with Masquelier's OPCs, even though the borrowers' "OPC" may have little or nothing to do with Masquelier's. "Some even go as far as using Masquelier's patronym [a scientific name created to honour a person, such as pycnogenol] in communication that, other than suggesting a relationship between their "OPCs" and the French professor, leaves the "OPCs" products undefined and unqualified. This is how you are being exposed to misleading information and misinformation," he said.[19]

The Herbal Extract Company's aim is not to be misleading and partake in "borrowed science" concerning the specific health benefits from researched Pycnogenol products, for the purpose of associating this science with full spectrum maritime pine bark. However it is a fact that full spectrum maritime pine bark also contains these antioxidants along with other vitamins and phytonutrients. Previous studies have demonstrated that other maritime pine bark extracts also possess remarkable antioxidant activities similar to Pycnogenol.[20]

The research associated with these isolated active constituents is interesting because it suggests there is potential in using full spectrum extracts which mirror the natural, balanced phytochemical profile of chemical compounds of the original dry herbal material. The advantage of a full spectrum extract is that, when extracted in a balanced way, the

synergistic activity of all the constituents allows the key compounds (OPCs) to work effectively for the patient.[21]

Remarkably recent research has demonstrated that pine bark extracts display stronger biological activity as a mixture than when separated into individual components, indicating that the components interact synergistically. This research was conducted on Flavangenol, a registered trademark in Japan, one of several pine bark extract formulations currently sold which is a complex mixture of bioflavonoids with OPCs as the major constituents. It is extracted from maritime pine or *Pinas sylvestris* (Scots pine).[22,23]

Actions

Antioxidant, anti-inflammatory, cardioprotective, antiallergic, diuretic, stimulating expectorant, stimulating diaphoretic, nutrient dense food, vulnerary, antimicrobial.

Pharmacological Activity

The vast majority of the research on maritime pine is proprietary and geared at promoting the trademarked Pycnogenol and its associated products. It appears in the literature that the terms Pycnogenol and pine bark extract are used interchangeably. This makes it extremely challenging to write a monograph about a full spectrum maritime extract because there is a dearth of information. Some selected Pycnogenol studies are mentioned below with the caveat that the author is not suggesting this information be extrapolated to full spectrum maritime pine extract but rather as a clue to what the isolated constituents are capable of.

Concentrated standardised extracts like Pycnogenol are not the same as whole plant (broad or full spectrum) maritime pine bark medicine in the same way that curcumin is not the same as using whole plant turmeric and cannabidiol is not the same as using full spectrum cannabis. For example when Pycnogenol is manufactured the fresh outer bark is powdered and extracted with 70% ethanol and 30% water in patented equipment allowing an automated continuous process. After purification (there is no further information on how this is done on the manufacturer's website) of the raw extract the aqueous solution of the extracted constituents is spray dried to a fine brownish powder during the standardisation process. According to the manufacturer 1000kg of maritime pine bark yields 1kg of Pycnogenol, making it 1000:1 (1kg equals 1g). In comparison The Herbal Extract Company make a 1:2 maritime pine extract, in 60% ethanol and 40% water, using continuous cold flow percolation in a simple process with no standardisation, heat or vacuum. The result is that 1mL (1g) of extract yields 500mg of maritime pine bark which is a very different, yet more sustainable, method of extraction. To get the equivalent 500mg of Pycnogenol you would need half a kilogram of maritime pine bark which is 500 times the amount The Herbal Extract Company use.[24]

In everyday life the body generates free radicals and other reactive oxygen species (ROS) which are derived either from the endogenous metabolic processes (within the body) or from external sources. Many clinical and pharmacological studies suggest that natural antioxidants can prevent oxidative damage. Among the natural antioxidant products maritime pine has received considerable attention because it is rich in proanthocyanidins which are strong quenchers of ROS and hence potent antioxidants with strong free radical scavenging activity.[25]

Free radical damage and oxidative stress have been implicated in the development of a number of chronic degenerative conditions including cardiovascular disease, arthritic and rheumatic disorders, cancer, inflammatory bowel disease, Alzheimer's disease, Parkinson's disease and renal disease.[26]

Although there may be many potential uses for full spectrum maritime pine, and Pycnogenol, the most extensively studied use of Pycnogenol is to treat cardiovascular health, especially improvement of endothelial (the thin layer of cells that lines blood vessels) function and chronic venous insufficiency, a condition defined by poor drainage of blood from veins resulting in swelling or skin problems. According to the 2019 official monograph for Pycnogenol by the American Botanical Council (ABC), seven controlled clinical trials have been published that show improvement of blood circulation, blood pressure normalisation, platelet

function normalisation and venous insufficiency. In addition five clinical trials have demonstrated the efficacy of Pycnogenol for hypertension and its complications. One study looked at the benefits of Pycnogenol on coronary artery disease and showed that the preparation improved endothelial function. All of these studies have shown a benefit however larger, and more rigorous studies, are warranted to confirm these findings.[27]

The ABC monograph also states that controlled human clinical trials for Pycnogenol have been published on the following potential uses: thrombosis (blood clots), diabetes and its complications, hypertension and its complications, coronary artery disease, asthma, attention deficit hyperactivity disorder, gynaecology (endometriosis, dysmenorrhea, pregnancy-associated pain and menopause transition), osteoarthritis, acute and postpartum haemorrhoids and memory. These indications have one to five well-designed, published clinical trials that support the findings. All of these studies have shown benefit but larger studies are needed to confirm the findings.[28,29,30,31,32,33]

Preliminary clinical trials have been conducted in the following areas but more trials are needed to support these potential uses: erectile dysfunction, retinopathy (a diseased condition of the retina in the eye), gingivitis (infection of oral gums), melasma (a dark discoloration of skin), sunburn, skin elasticity and hydration, muscle cramps and pain, post thrombotic syndrome, diabetic microangiopathy (disease of small blood vessels), metabolic syndrome, allergic rhinitis, common cold, psoriasis, chemotherapy/radiotherapy side effects and tinnitus.[34,35,36,37]

The manufacturers say that as an antioxidant Pycnogenol may be effective at any dose however in order to have measurable physiological effects related to prevention of oxidative tissue damage the daily intake should be at least 20mg. When used as a preventative measure for cardiovascular health 25mg per day is recommended.[38]

Indications

- Antioxidant therapy which may assist cardiovascular health, hypertension, cholesterol reduction, fluid retention, chronic venous insufficiency, diabetes, diabetic retinopathy, gingival bleeding/plaque, venous leg ulcers
- Common cold and influenza symptoms, asthma, bronchitis, sinusitis, upper respiratory catarrh
- Rheumatism, arthritis

Energetics

Warming, drying, pungent, bitter, sour.

Use in Pregnancy

No information available.

Contraindications

Because of its astringent nature, which may irritate the stomach of sensitive individuals, it may be best to take maritime pine with or after meals to avoid minor gastrointestinal discomfort.

Drug Interactions

None known.

Administration and Dosage

Liquid Extract:	1:2
Alcohol:	60%
Weekly Dosage:[39]	5 to 10mL

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