

# THE AUSTRALIAN CHERRY REPORT

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**NOVEMBER 2010**

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## A powerful “super” fruit story

The Cherry Report is a summary of the currently available scientific literature on the potential health and anti-ageing benefits of cherries. The report aims to provide an overview of the scientific evidence, not to provide individual recommendations. The information is not intended to substitute for the advice of a physician or healthcare professional.

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### CHERRIES SNAPSHOT

- **A true “superfruit”** – Emerging studies suggest phytonutrients found in cherries may have the ability to reduce the risk of heart disease, certain cancers, diabetes, and even alleviate gout and arthritis pain.
- **Antioxidant advantage** – Cherries are a power-packed food loaded with anthocyanins – the antioxidants responsible for their deep red colour – and other flavonoid antioxidants such as quercetin and kaempferol.
- **Essential nutrients** – Cherries provide a good source of vitamin C and a source of potassium and fibre.

## **A true “Super Fruit”**

Researchers continue to explore the existence of “superfruits” - a unique group of nutrient-rich fruits that contain natural compounds shown to have potential disease-fighting properties. Few fruits fall into this category, but the cherry should be considered one of them. Emerging research shows fresh cherries are a rich source of certain antioxidants and contain other phytonutrients - plant pigments that have been linked to a variety of health promoting benefits, including anti-inflammatory, anti-cancer, anti-diabetes, and anti-obesity effects. Cherries provide a unique combination of phytonutrients in one package that work together to deliver health benefits not available in antioxidant supplements or pills (1).

## **History of cherries**

A member of the Rosacea (rose) family, cherries are a small, plump stone fruit. They have been cultivated in southern Australia since the late 19th Century when they were introduced to the New South Wales town of Young, now known as the cherry capital of Australia.

## **Varieties**

There are two main cherry species. Sweet cherries (*Prunus avium* L.) often sold at fresh food grocers as fresh cherries and sour cherries (*Prunus cerasus* L.) also known as tart cherries. In Australia sour cherries are more commonly consumed through processed products such as juices, or preserved to be later used in cooking and for making cherry brandy.

Today there are more than 50 cherry varieties grown and many more are being developed in Australia. The specific varieties available on the Australian market, such as the Merchant, Ron Seedling, Bing, Lapin, Sweetheart and Sweet Georgia, vary in colour from light to deep red and almost black. The rarer Rainier ‘white’ cherry, another sweet variety, has a beautiful creamy yellow skin with a red blush. Sour cherries, on the other hand are more commonly grown in Europe, although there are some plantations in Victoria and Tasmania. The most well known variety of sour cherry is the Morello.

## **Red power**

Cherries contain powerful antioxidants called anthocyanins. These belong to a large family of phytonutrients called flavonoids, linked to a variety of health benefits, and provide cherries with their deep, rich red colour.

The potential health benefits of cherries first came to light in the 1990s, when a number of studies were published describing the antioxidant content of this fruit. Spurred on by what was then anecdotal evidence that cherries alleviated the pain of arthritis and

gout, researchers discovered that cherries had high antioxidant activity. Since then, in vitro research conducted in 2001 at the Michigan State University found that cherries were the richest sources of certain anthocyanins, cyanidin-3-glucosylrutinoside and cyanidin-3-rutinoside (noted as anthocyanins 1 and 2 in Figure A) as compared to various berries, including red raspberries, blackberries and strawberries, containing 30 to 40 milligrams of anthocyanins in every 100 grams of fruit (2).

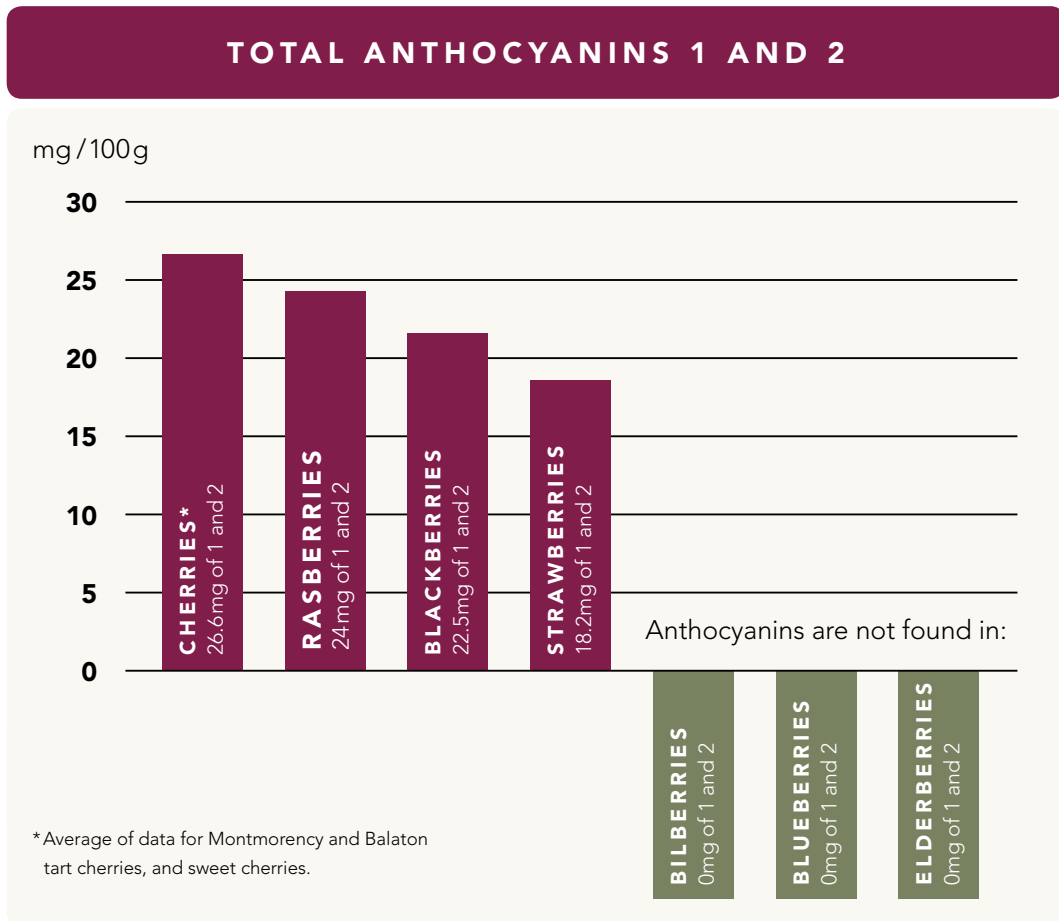


Figure A. Comparison of total anthocyanins 1 and 2 in selected berries. Source: Seeram and Momin et al 2001 as cited in the Cherry Nutrition Report, 2007.

### The antioxidant advantage

Antioxidants are substances that may protect cells from damage caused by unstable oxygen molecules known as free radicals. Free radicals are unstable molecules that are generated when we engage in everyday activities, such as eating, breathing and exercising, as well as when we're exposed to pollution, cigarette smoke and the sun's ultraviolet rays. Fortunately, our bodies' antioxidant system (which is topped up by dietary antioxidants) is effective at squelching the audacious free radicals that bombard our bodies' delicate cells every day. Studies spanning decades of research consistently show that maintaining a high antioxidant defense system lowers a

person’s risk of cardiovascular and neurodegenerative diseases, helps protect against certain cancers and helps slow the ageing process.

The antioxidant strength of a food can be measured in Oxygen Radical Absorbance Capacity (ORAC) units. The ORAC analysis is a standard measure quantifying the “power” of antioxidants in foods. It measures the capacity of a food to ‘mop up’ destructive free radicals. It is thought that the higher the ORAC score, the better a food is at helping our bodies prevent and fight disease.

According to a new study from the University of Michigan, published in Food Chemistry 2010, the unique compounds in sour cherries may work in concert to deliver a powerful ‘cocktail’ of antioxidants. The researchers in this study isolated individual cherry phytonutrients and tested their antioxidant power in isolation versus paired together. They found that the “whole” was greater than the sum of the parts (3). It appears that phytonutrients contained in a natural food matrix work together to boost antioxidant power more than by what would be expected from adding up their individual antioxidant effects.

A study published in the American Journal of Clinical Nutrition found that sour cherries ranked 14 in the top 50 foods for highest antioxidant content per serve – and are among well known ‘superfoods’ such as red wine, berries and dark chocolate (4). Data from the USDA Human Nutrition Research Centre on Ageing at Tufts University confirmed sour cherries contained similar or higher amounts of antioxidants compared to certain berries, as illustrated in Figure B (5).

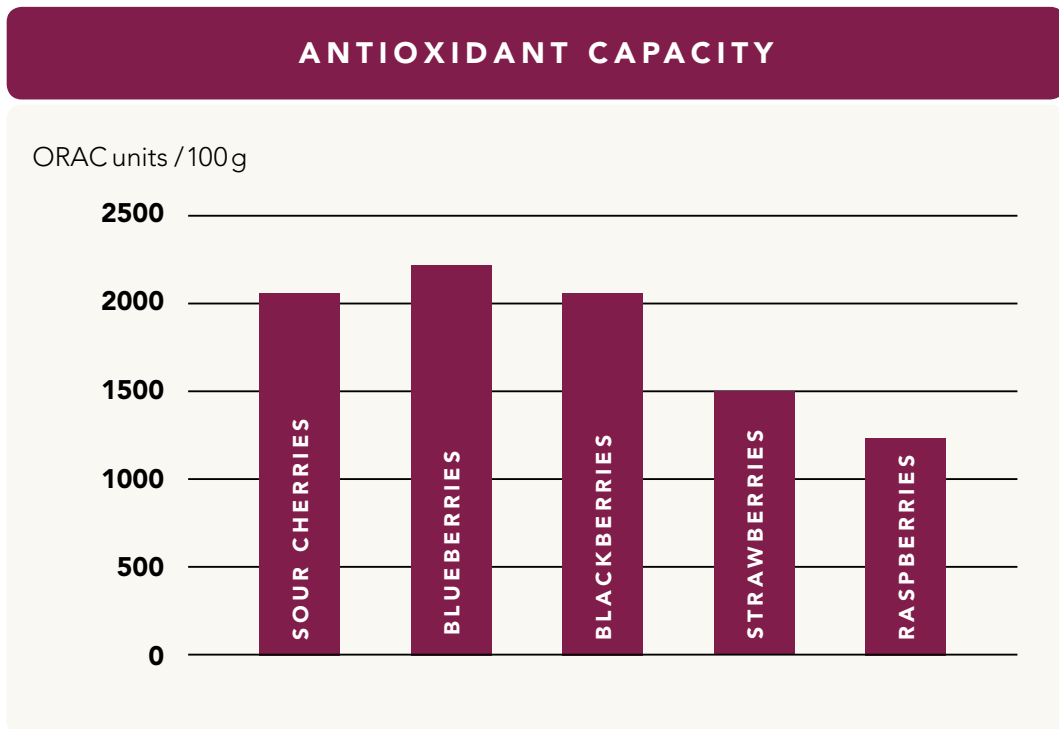


Figure B. Comparison of total antioxidant capacity of sour cherries and popular berries

Free radicals are believed to be a major contributing factor in the production of fine lines and wrinkles by destroying the collagen and elastin network, which keeps our skin supple and firm. Eating foods rich in antioxidants, such as cherries, may help to reduce and neutralise free radicals and slow the signs of skin ageing.

Emerging research suggests that the natural compounds found in cherries may help:

- Offer protection against cardiovascular disease and certain cancers.
- Reduce inflammation and ease arthritis and gout pain.
- Reduce the risk of diabetes.

## Emerging Areas in Cherry Research

### Heart disease

A growing body of science links the anthocyanins found in cherries to heart-health benefits. With more than 3.67 million Australians living with some form of heart disease (6), the heart-healthy qualities of red pigments from plant foods have more relevance than ever!

Recent research with animals revealed that cherry-enriched diets lowered risk factors for heart disease, such as reducing total blood cholesterol and triglyceride levels, while slightly raising high-density lipoproteins (HDL) - the "good" cholesterol (7). Additionally, a US investigation from the Department of Agriculture's Human Nutrition Research Centre in California found healthy men and women who supplemented their diets with 280 grams of sweet cherries (approximately 45 cherries) for 28 days had a 25 percent reduction in C-reactive protein (CRP), an inflammatory marker which is associated with cardiovascular disease (8).

**Bottom line:** A growing body of evidence links cherries' unique combination of phytonutrients and rich red colour, provided by the fruit's powerful anthocyanins, to protection against heart disease.

### Cancer Prevention

Several researchers have attributed cancer-preventative properties to antioxidants found in plant foods. In 2004, researchers investigated the effects of 10 different fruit

extracts (including from sweet cherries) on the cell proliferation of colon and breast cancer cells in the test tube. The results showed that the fruit extracts decreased the growth of both colon cancer cells (HT29) and breast cancer cells (MCF-7) (9). A similar finding, using sour cherries or isolated anthocyanins for colon cancer cells was also reported by researchers at Michigan State University. Further these researchers conducted a feeding study with mice which showed a significantly lower number of tumours in the caecum among animals fed sour cherries as compared to a control diet, although there was no significant reduction in tumours of the small intestine or colon. Surprisingly, supplementing the diet of mice with anthocyanins produced significantly fewer tumours at all three sites of the intestine (small intestine, caecum, colon). The researchers suggested that "...sour cherry anthocyanins may reduce the risk of colon cancer" (10).

**Bottom line:** The science points to cherries' rich source of phytonutrients, including anthocyanins, as the basis for their potentially protective role in some cancers.

## Arthritis & Gout

Gout is a common form of arthritis characterised by recurrent attacks of pain, swelling and redness in joints. Gout occurs when uric acid builds up in the bloodstream and uric acid crystals are deposited in the joints. Around 70,000 people in Australia have this form of arthritis (11).

For decades, cherries have quietly grown a devoted fan base of arthritis and gout sufferers, who routinely consume the fruit to help soothe their symptoms. In fact, the suggestion that cherries might assist with arthritis and gout was first proposed in the 1950s. Preliminary research found that daily cherry consumption (approximately 4.5 cups of cherries) helped to relieve "gout attacks" and the pain associated with arthritis. Interestingly, after eating cherries, the patients in the study had lower blood levels of uric acid (12).

Since then, several small-scale studies have confirmed this anti-arthritis link with cherries. A US investigation found that healthy women (aged 20-40 years) who consumed two servings of Bing sweet fresh cherries (about 45 cherries) for breakfast experienced a 15 percent reduction in blood uric acid levels, suggesting that natural substances in Bing sweet cherries may help reduce arthritic inflammation (13).

**Bottom line:** Research demonstrates that anthocyanins and other antioxidants in cherries may have a beneficial role in a range of inflammatory-related conditions, including arthritis and gout.

## **Weight management**

According to the Australian Bureau of Statistics (ABS) National Health Survey (2005), 1 in 2 Australian adults, (equivalent to 7.4 million people) are overweight or obese (14). Irrespective of height or build, if excess fat accumulates around the waistline, there is an increased risk of developing chronic disease, such as some cancers, heart disease, and type 2 diabetes.

In 2009, researchers at the University of Michigan found animals fed a cherry-containing diet over a 12-week period, were able to reduce their total body fat by 18 percent, in particular the “belly fat” that is most often associated with heart disease risk (15). Similarly, another study found that feeding anthocyanins to mice on high-fat diets suppressed diet-induced increases in body weight, and normalised elevated blood glucose (sugar), insulin and lipid (fat) levels induced by the high fat diet (16).

## **Diabetes**

Not only are cherries an antioxidant powerhouse; fresh sour cherries have a low Glycemic Index (GI) score of 22, and fresh sweet cherries have an intermediate GI of 63. The GI ranks carbohydrate foods according to their effect on blood sugar levels. Choosing low GI foods results in smaller rises in blood sugar and insulin levels. A low GI diet is suggested to be a key to long-term health, reducing the risk of heart disease, type 2 diabetes, obesity and certain cancers.

One animal study showed that a single dose of anthocyanins decreased fasting blood glucose levels by 19 percent and improved glucose tolerance by 29 percent in moderately diabetic rats. After four weeks of treatment with anthocyanins, fasting blood glucose levels had dropped to half of the pre-treatment levels and glucose tolerance had improved by up to 41 percent (17). In 2009 Seymour et al conducted an animal study over a three month period and showed that a diet supplemented with anthocyanin-rich sour cherries was associated with significantly reduced body weight, abdominal fat, reduced blood lipids (fats), and reduced fasting blood sugar levels when compared to the control diet. The researchers in this study concluded from these results that sour cherries may reduce the degree of risk factors associated with type 2 diabetes and heart disease (15).



## **Other Potential benefits...**

### ***Sleep Promoting Melatonin***

Melatonin, a hormone produced naturally by the body, helps to regulate the body's circadian rhythms and natural sleep patterns. A preliminary study conducted by Reiter's group at the University of Texas Health Science Centre found that consuming a daily serve of sour cherries may help increase melatonin levels in the bloodstream enough to possibly improve the body's natural sleep patterns (18,19). The researchers also noted that melatonin works best when consumed one hour prior to sleep time. However, further research is warranted to confirm a role for cherries in sleep promotion, as the evidence to date is very preliminary.

*Cherries are one of the few natural food sources of melatonin, a potent antioxidant that helps improve the body's circadian rhythms and natural sleep patterns.*

### ***Exercise induced muscle soreness***

Emerging research suggests that anti-inflammatory components in cherries may promote the repair of muscles that have been damaged by exercise. This effect has been attributed to specific anthocyanins, shown to help relieve muscle pain and joint soreness associated with inflammation.

A recent study by Oregon Health and Sciences University revealed that runners who drank 300ml sour cherry juice (equivalent to 45-50 cherries) twice a day for seven days

prior to, and on the day of a long-distance relay, had significantly less muscle pain following the race. Researchers suggest that the properties found in sour cherry juice may work like common pain medications used by athletes to reduce post-exercise muscle soreness (20).

### ***Guilt-free indulgence***

While there are currently no established recommendations on how many cherries you should eat to reap a range of potential health benefits, research suggests that consuming 1-2 cups (up to 45 cherries) daily – particularly sour cherries – may help provide some of the health benefits identified.

Cherries have only 250 kilojoules (60 calories) per 100 grams and virtually no fat.

One serve of cherries equals ½ cup dried cherries, 1 cup of fresh or frozen cherries, 1 cup cherry juice or 2 tablespoons cherry juice concentrate.

### **Newspoll consumer research**

A national online Newspoll survey conducted in September 2010 has revealed that Australians aged 18-64 consider various berries and cherries to be high in antioxidants compared to other common summer fruits (21). When asked whether each of the following fruits are high in antioxidants or not, 71 percent responded yes to blueberries, 58 percent to strawberries and 45 percent to cherries, while 39 percent believed oranges are high in antioxidants, 36 percent voted yes for apples, 26 percent for mangoes, 22 percent for peaches and 14 percent for watermelon.

Cherries are a very attractive fruit and much appreciated for their taste, sweetness and wealth of nutrients. Like some deeply coloured berries, cherries stand out for their high antioxidant content.

### **When it comes to cherries, fresh is best**

Fresh cherries appear to contain more antioxidant phytonutrients compared to processed cherry products. One reason for this may be that the anthocyanins in cherries are found mainly in their skin (22). When cherries undergo processing to make juice and wine, their antioxidant capacity can be reduced by up to 77 percent and 95 percent, respectively.

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