



## SEA BUCKTHORN AS A NATURAL PHYTOCONSTITUENTS FROM HOLISTIC SOURCE

**Dr. Dhrubo Jyoti Sen\***

School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM: 4/1, Kolkata-700091, West Bengal, India.

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**Corresponding Author: Dr. Dhrubo Jyoti Sen**

**Address:** School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM: 4/1, Kolkata-700091, West Bengal, India.

### ABSTRACT

Sea buckthorn (*Hippophae rhamnoides* L.) is a plant with various nutritional and medicinal properties. It contains vitamins, carotenoids, polyphenols, fatty acids, and phytosterols, which have antioxidant, anticancer, anti-hyperlipidemic, anti-obesity, anti-inflammatory, antimicrobial, antiviral, dermatological, neuroprotective, and hepatoprotective effects. Sea buckthorn can be used as a functional food or a dietary supplement for the prevention and treatment of chronic diseases. This review summarizes the phytochemistry, health benefits, and food applications of sea buckthorn, and highlights the potential and challenges for its further development and utilization. Sea buckthorn not only has great medicinal and therapeutic potential, but also is a promising economic plant. The potential of sea buckthorn in the human food industry has attracted the research interest of researchers and producers. The present review mainly summarizes the phytochemistry, nutrients, health benefits, and food applications of sea buckthorn. Overall, sea buckthorn is a dietary source of bioactive ingredients with the potential to be developed into functional foods or dietary supplements for the prevention and treatment of certain chronic diseases, which deserves further research.

**KEYWORDS:** Sea buckthorn, Antiviral, Dermatological, Neuroprotective, Anti-inflammatory, Health benefits.

## INTRODUCTION

Sea buckthorn contains antioxidants which help protect your cells from damage caused by free radicals. This damage can lead to serious diseases such as cancer, stroke, and cardiovascular diseases.<sup>[1]</sup>



**Figure 1: Sea Buckthorn.**

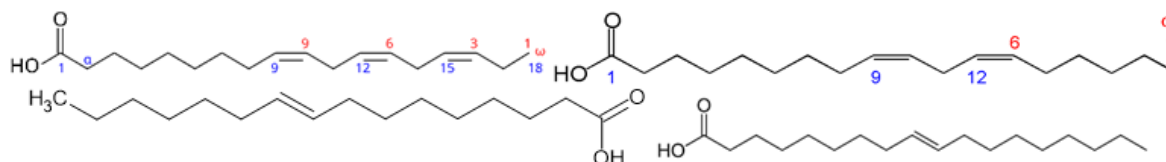
Eating antioxidants can help reduce your risk of potentially life threatening diseases. The high contents of these bioactive compounds, shown to have health promotive properties, make sea buckthorn berries very interesting from a health perspective. The berries are juicy and have a distinctive flavor and an attractive, bright yellow-orange color, caused by the carotenoids present. Sea buckthorn contains vitamins A, B1, B2, B6, and C, as well as other active ingredients. It's been used traditionally to slow down the aging process. It is also known as Chharma in Himachal Pradesh. Sea buckthorn is a deciduous shrub which reaches 0.5–6 m in height also known for its immunity-boosting and medical properties. Sea buckthorn contains antioxidants which help protect your cells from damage caused by free radicals. This damage can lead to serious diseases such as cancer, stroke, and cardiovascular diseases. Eating antioxidants can help reduce your risk of potentially life threatening diseases.<sup>[2]</sup>

Hippophae is the genus of sea buckthorns, deciduous shrubs in the family Elaeagnaceae. The name sea buckthorn may be hyphenated to avoid confusion with the unrelated true buckthorns (Rhamnus, family Rhamnaceae). It is also referred to as sandthorn, sallowthorn, or seaberry. It produces orange-yellow berries, which have been used over centuries as food, traditional medicine, and skin treatment in Mongolia, Ladakh, Russia, Ukraine, and northern Europe, which are its origin regions. They are exceptionally hardy plants, able to withstand winter temperatures as low as  $-43^{\circ}\text{C}$  ( $-45^{\circ}\text{F}$ ). As Hippophae species develop an aggressive and extensive root system, they are planted to inhibit soil erosion and used in land reclamation for their nitrogen fixing properties, wildlife habitat, and soil enrichment.

Hippophae berries and leaves are manufactured into various human and animal food and skincare products.<sup>[3]</sup>

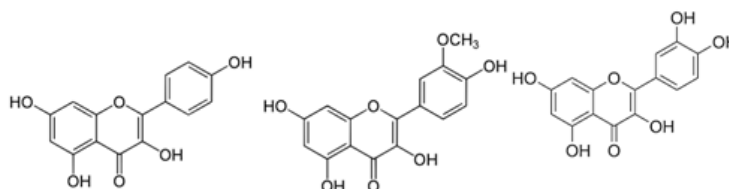
Kingdom: Plantae, Clade: Tracheophytes, Clade: Angiosperms, Order: Rosales

Family: Elaeagnaceae, Genus: *Hippophae rhamnoides* L.



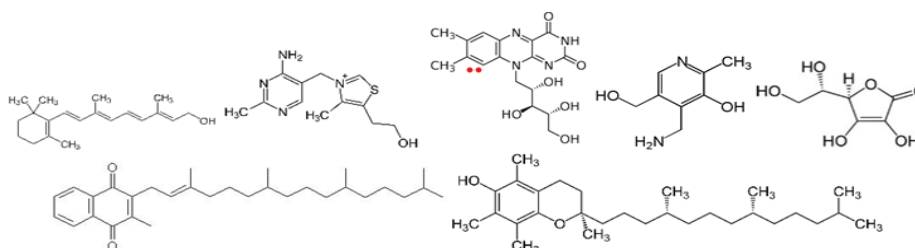
**Figure 2: Omega Fatty Acids [ $\omega$ -3,  $\omega$ -6,  $\omega$ -7,  $\omega$ -9 fatty acids].**

Antioxidant chemicals, especially phenolic components such as flavonoids kaempferol, isorhamnetin, and quercetin, are responsible for sea buckthorn's antitumor action. These flavonoids defend against oxidative stress, which can cause cancer and genetic alterations in cells.<sup>[4]</sup>



**Figure 3: Kaempferol, Isorhamnetin and Quercetin.**

The leaves, flowers, seeds, and fruits are used as medicine. Sea buckthorn contains vitamins A, B1, B2, B6, and C, as well as other active ingredients. It's been used traditionally to slow down the aging process.



**Figure 4: Vitamin A, Vitamin B1, Vitamin B2, VitaminB6, Vitamin C, Vitamin K, Vitamin E.**

### Benefits of Sea Buckthorn Oil

Rich in many nutrients. Sea buckthorn is rich in various vitamins, minerals, and beneficial plant compounds.

May protect your skin.  
May promote heart health.  
May reduce blood sugar levels.  
May boost your immune system.  
May support liver health.  
May have anticancer effects.

Sea buckthorn oil has been used for thousands of years as a natural remedy for various ailments. It is extracted from the berries, leaves, and seeds of the sea buckthorn plant (*Hippophae rhamnoides*), which is a small shrub that grows at high altitudes in the northwest Himalayan region. You can apply it to your skin or take it orally. Sometimes referred to as the holy fruit of the Himalayas, it's a popular remedy in Ayurvedic and traditional Chinese medicines. It's said to provide health benefits ranging from more radiant hair and skin to a lower risk of cancer and heart disease.<sup>[5]</sup>



**Figure 5: Sea Buckthorn Oil.**

**Here are 11 science-backed benefits of sea buckthorn oil:**

**1. Rich in many nutrients:** Sea buckthorn is rich in various vitamins, minerals, and beneficial plant compounds. It's naturally full of antioxidants, which help protect your body against aging and illnesses like cancer and heart disease.

Its berries are especially rich in vitamins A, C, K, and E. They also contain considerable amounts of iron, calcium, magnesium, potassium, copper, and zinc. In addition, its seeds and leaves are rich in phytosterols, a plant compound with many benefits — including blocking cholesterol from your diet from being absorbed in your body. This is one way in which sea buckthorn oil is thought to reduce your risk of heart disease. This oil can be sourced from the sea buckthorn seeds or berries and is considered the most valuable component of the plant. It

contains a high proportion of palmitoleic acid, which is also found in the fat of human skin. As such, this oil is thought to speed wound healing and keep your skin healthy. Interestingly, sea buckthorn oil may also be one of the only plant foods known to provide all four omega fatty acids. What's more, more than half of the fat found in this oil is mono- and polyunsaturated fat, which are two types of healthy fats. Sea buckthorn oil is rich in various vitamins and minerals, as well as antioxidants and other plant compounds that may support your health.

**2. May protect your skin:** Sea buckthorn oil has been used as a traditional skin treatment for centuries. It's rich in unsaturated fat, antioxidants, phytosterols, carotenoids, and vitamins E and K — all of which function together to protect your skin's integrity and promote its renewal. Sea buckthorn oil is also rich in palmitoleic acid, which is a type of fat naturally found in human skin that can be used to treat burns and promote wound healing. It's also a good source of linoleic acid (LA), an omega-6 fatty acid that's the most abundant fatty acid in human skin. Research suggests that LA may reduce acne and psoriasis, as well as protect against dry or scaly skin. In addition to LA, sea buckthorn oil contains other omega-6 fats, such as gamma linolenic acid (GLA), which may help reduce eczema and improve acne. Furthermore, compounds in sea buckthorn oil appear promising in protecting your skin from the damaging effects of UV rays from the sun. Perhaps unsurprisingly, sea buckthorn is commonly added to various pro-aging or wrinkle-reducing products. It's also a common ingredient in products intended to treat dry, irritated, flaky or itchy skin. That said, few of these purported benefits have been researched in humans. One of the only available studies reported lower psoriasis symptoms after application of a sea buckthorn extract for 4–8 weeks. Therefore, more studies are needed before strong conclusions can be made. Sea buckthorn oil may help your skin heal from wounds and burns more quickly. It may also improve acne, eczema, and psoriasis, although more research is needed.<sup>[6]</sup>

**3. May promote heart health:** Sea buckthorn oil may benefit heart health in several ways. For starters, it's rich in phytosterols, which are plant compounds with antioxidant and anti-inflammatory functions that help protect your body from damage and disease, including heart disease. These compounds also help block the absorption of cholesterol from your diet, which can help prevent LDL (bad) cholesterol from creating blockages in your blood vessels and arteries. Additionally, sea buckthorn oil is a good source of quercetin, an antioxidant that's directly linked to a lower risk of heart disease. Although one older study further suggests that

sea buckthorn oil may help reduce heart disease risk by preventing the formation of blood clots, more recent studies are needed.

In a 30-day study, taking 0.15 teaspoons (0.75 mL) of sea buckthorn oil daily helped reduce blood pressure levels in people with high blood pressure. Triglycerides and total and LDL (bad) cholesterol levels also dropped in those who had high cholesterol. However, the effects on people with normal blood pressure and cholesterol levels were less pronounced. One review also determined that sea buckthorn extracts may reduce cholesterol levels in people with poor heart health — but not in healthy participants. Sea buckthorn oil may aid your heart by reducing blood pressure, improving cholesterol levels, and protecting against blood clots. That said, its effects may be strongest in people with poor heart health.

**4. May reduce blood sugar levels:** Sea buckthorn oil may help prevent diabetes and support healthy blood sugar. Animal studies show that it may help reduce blood sugar levels by increasing insulin secretion and insulin sensitivity. Overall, the better your body is able to secrete insulin, and the more sensitive your cells are to it, the lower your risk of type 2 diabetes. Still, few human studies have examined the blood sugar-lowering effect of sea buckthorn oil directly. In one of the few recent studies, 38 people with impaired blood sugar regulation — a risk factor for type 2 diabetes — drank 3 ounces (90 mL) of sea buckthorn fruit purée or a placebo for 5 weeks. Their fasting blood sugar levels were significantly lower after taking the sea buckthorn fruit purée than the placebo. However, the drop in fasting blood sugar levels after 5 weeks was only 0.14 mmol/L, which is considered quite small. Furthermore, this study was quite small. Overall, more comprehensive research is needed. Sea buckthorn may help improve insulin secretion, insulin sensitivity, and blood sugar levels, all of which may protect against type 2 diabetes — though more research is needed.<sup>[7]</sup>

**5. May boost your immune system:** Sea buckthorn oil may help protect your body against infections. Experts attribute this effect, in large part, to the high flavonoid content of the oil. Flavonoids are beneficial plant compounds that may strengthen your immune system by increasing resistance to illnesses. In one test-tube study, sea buckthorn oil safeguarded against influenza, herpes, and HIV viruses. Sea buckthorn oil also contains a good amount of antioxidants, which may also likewise defend your body against microbes. That said, research in humans is lacking. Sea buckthorn oil is rich in beneficial plant compounds like flavonoids and antioxidants, which may help your body fight infections. However, more research is needed.



**6. May support liver health:** Sea buckthorn oil may contribute to a healthy liver. That's because it contains healthy fats, vitamin E, and carotenoids, all of which may safeguard liver cells from damage. In one older study, sea buckthorn oil significantly improved markers of liver function in rats with liver damage. In another older, 6-month study, people with cirrhosis — an advanced form of liver disease — who took 15 grams of sea buckthorn extract 3 times per day increased their blood markers of liver function significantly more than those given a placebo. Although these effects seem promising, more recent human studies in humans are needed. Compounds in sea buckthorn may aid liver function, though more research is necessary.

**7. May have anticancer effects:** Compounds like flavonoids and antioxidants in sea buckthorn oil may have anticancer effects. For instance, sea buckthorn is rich in quercetin, a flavonoid which appears to help kill cancer cells. Sea buckthorn's various other antioxidants, including carotenoids and vitamin E, may also offer protection. A few test-tube and animal studies suggest that sea buckthorn extracts may help prevent the spread of cancer cells. Research in animals further suggests that sea buckthorn may safeguard healthy cells from the effects of radiotherapy, which is a common cancer treatment. Keep in mind that these effects haven't been tested in humans, so more studies are needed. Sea buckthorn oil provides certain plant compounds that may protect against cancer. However, human research is lacking.

**8–11. Other potential benefits:** Although sea buckthorn oil is purported to give additional health benefits, not all claims are backed by science. Those with the most evidence include: May improve digestion. Animal studies indicate that sea buckthorn oil may help prevent and treat stomach ulcers. May relieve symptoms of menopause. Sea buckthorn may reduce vaginal drying and act as an effective alternative treatment for postmenopausal women who cannot take estrogen. May treat dry eyes. One study linked daily sea buckthorn intake to reduced eye redness and burning. May improve the appearance of hair. Sea buckthorn contains small amounts of lecithin, a type of fat that may remove excess oil from your hair. It may also help repair damaged hair and restore its elasticity. It's important to note that most of these studies are small and very few involve humans. Therefore, more research is needed before strong conclusions can be made. Sea buckthorn may offer an array of additional health benefits, ranging from reduced inflammation to menopause treatment. However, more studies — especially in humans — are needed. The results indicate that sea buckthorn seeds have antioxidant activity that is not impaired by thermal processing and possess anticoagulant potential, but more research is needed in order to ascertain which compounds are responsible

for these effects, especially in *in-vivo* models. Sea buckthorn oil has anti-inflammatory and anti-psoriatic properties. The possible mechanism for these effects may be that the high levels of fatty acids in sea buckthorn oil acts to inhibit reactive nitrogen and down-regulate nuclear factor kappa-B (NF- $\kappa$ B) protein and pro-inflammatory cytokines. Sea buckthorn contains various antioxidants, such as phenolic compounds, flavonoids, carotenoids, tocopherols, tocotrienols, and vitamin C. These antioxidants can help prevent or reduce oxidative stress, inflammation, and DNA damage in the cells.<sup>[8]</sup>

## CONCLUSION

Sea buckthorn is a plant that has many uses and benefits for humans, animals, and the environment. It contains various essential fatty acids, antioxidants, vitamins, and other bioactive compounds that have been shown to have antioxidant, anti-inflammatory, immunomodulatory, anti-cancer, hepatoprotective, neuroprotective, and skin-protective effects. Sea buckthorn is also a potential source of functional foods, dietary supplements, and cosmeceuticals that can help prevent and treat various chronic diseases. Sea buckthorn is a promising plant that deserves further research and development.

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