

Products made from sea buckthorn that have medicinal value are still rare in Indian markets, which should be increased substantially (Stobdan et al. 2011).

### 12.2.1 BIOCHEMICAL COMPOSITIONS

Sea buckthorn fruits contain 60–80% juice rich in sugar, organic acids, amino acids and vitamins, and are among the most nutritious of all berries. The content of soluble sugars ranges from 9.3° to 22.74° Brix and it contains little higher glucose than fructose and xylose. The concentration of vitamins A, B<sub>2</sub> and C is much higher than other fruits and vegetables such as carrots, tomatoes, oranges, etc. Sea buckthorn berries also contain appreciable levels of vitamin B<sub>1</sub> and K. Vitamin C represents a nutrient of major importance in sea buckthorn because of its presence in large quantities ranging from 200–2500 mg/100g. Presence of these antioxidant vitamins in high quantity indicates its strong antioxidant properties. Considering that fresh orange juice contains 35–56 mg/100 mL and Aonla contains 478.5 mg/100 mL, the value of sea buckthorn as a source of vitamin C is apparent. The high vitamin concentration makes sea buckthorn fruit highly suitable for the production of nutritious soft drinks. During the Seoul Olympic Games in 1988, China designated a sea buckthorn sports drink as the official beverages for its athletes. Russian cosmonauts were also supplied with sea buckthorn beverages to enhance their health and resistance to stress (Stobdan et al. 2011; Mishra et al. 2009c, 2011). There are 24 minerals in sea buckthorn juice, including calcium, magnesium, phosphorus, iron, manganese, sodium, potassium and aluminum, among others. Potassium is the most abundant of all the elements, and sea buckthorn juice is also rich in organic acids (2.1–9.1 g/100 mL). Malic and quinic acids are the major acids together constituting around 90% of all the fruit acids (Ma et al. 1989). Eighteen different kinds of free amino acids have been detected in juice, of which eight are essential (Chen et al. 1991).

The results of the Leh-Ladakh samples, showed the presence of high content of multivitamins, including vitamin C (275 mg/100 g), vitamin A (432.4 IU/100 g), vitamin E (3.54 mg/100 g), riboflavin (1.45 mg/100 g), niacin (68.4 mg/100 g), pantothenic acid (0.85 mg/100 g), vitamin B<sub>6</sub> (1.12 mg/100 g) and vitamin B<sub>2</sub> (5.4 mg/100 g). Similarly, the mineral composition revealed a high amount of minerals including potassium (647.2 mg/L), calcium (176.6 mg/L), iron (30.9 mg/L), magnesium (22.5 mg/L), phosphorous (84.2 mg/L), sodium (414.2 mg/L), zinc (1.4 mg/L) and manganese (1.06 mg/L) (Stobdan et al. 2010). Its juice is known to possess antifreeze properties (Bajpai et al. 2009, 2010).

Sea buckthorn leaves also contain many nutrients and bioactive substances such as carotenoids, free and esterified sterols, triterpenols, isoprenols and approximately 15% of proteins. The flavonoid content in leaves ranges from 312–2100 mg/100 g of air-dried leaves. The oil content of sea buckthorn ranges from 1.5% to 3.5% in fruit pulp and about 9.9% to 19.5% in seeds. Oil extracted from seed and pulp differs considerably in fatty acid composition. Oil from the sea buckthorn juice and pulp is rich in palmitic (16:0) and palmitoleic (16:1) acids, while the seed oil contains the essential fatty acids, which are linoleic (18:2) and linolenic (18:3) acids. One of the many special features of sea buckthorn fruit is the exceptionally high content of tocopherols and tocotrienols. The total content of tocotrienols varied from 1.5–8.1 mg/kg<sup>-1</sup> in