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Scope for developing antioxidant rich products from underutilized fruit Leh berry- A Review.

M. Selvamuthukumaran

Biochemistry & Nutrition Division, Defence Food Research Laboratory, Mysore.

Key Words

Sea buckthorn,Value addition,Antioxidants, Leh berry,Medicinal value,Nutritional value

Abstract

Sea buckthorn berries are among the most nutritious and vitamin-rich fruit found in the plant kingdom. In India, it is distributed wildly in various parts of the Himalayan region. All parts of the plant viz., bark, leaves and fruits are rich in biomolecules with unique medicinal values. The array of biomolecules synthesized by sea buckthorn has imparted a central role to the plant not only as a health promoter but also for prevention and treatment of different diseases. However, the fruit is highly acidic and having very peculiar flavor, due to these reasons the utilization of these fruits for edible purposes is very minimal. Adding to these limitations, the plant is very thorny, the fruits are very delicate, difficult to harvest. On top of all these the fruit ferments very fast after harvesting. By and large the plant as a whole is being wasted or at the most it is being used as fodder for animals and fencing for the houses. Therefore, keeping in view the superior health benefits and unavailability of sea buckthorn based products in India, this review will stress about importance of developing value added products with proven health benefits from this fruit for its commercial exploitation.

Introduction

Sea buckthorn: Origin, Common Names and Distribution

Sea buckthorn (Hippophae rhamnoides Lin.) is a high altitude temperate plant belonging to the family Elaegnaceae. Sea buckthorn is said to be a native of Himalayas, Middle/ Mediterranean region, Asia and Siberia. It is recognised differently in different parts of the world for eg. 'Oblepicha in Russia', 'Sanddorn' in Germany, 'Argousier' in France, 'Espino-Armarillo' in Spain, 'Finbar' or 'Havthorn' in Sweden, 'Tindred' in Denmark, 'Rokitnik' in Poland, 'Yashildro Chatsargana' in Mongolia, 'Shaji' in China, 'Duindoor' in Dutch, 'Tyrni' in Finnish, 'Olivellospinoso' in Italy and 'Tarbu' in Tibet. In India, it is known as 'Chharama' in Himachal Pradesh, 'Chuck', 'Dhurchuk' or 'Chuma'/ 'Tarwa' in Uttaranchal, 'Tare' or 'Taroobo' in North East region (Sikkim and Arunachal Pradesh) and 'Tsestalullu' in Ladakh (Dwivedi et al., 2006).

In India, it is distributed wildly in various parts of the Himalayan region like Lahul and Spiti valley of Himachal Pradesh, in Uttaranchal Himalaya it is found mainly in Bhagirathi Ghat, Sukki Ghat, Harsil Ghat, Gangotri Ghat, Mandakini Ghat, Alknanda Ghat, Jamuna Ghat etc. It also grows in several countries like China, Russia, Britain, Germany, Finland, Romania, France, Nepal, Bhutan and Pakistan at an altitude of 2500-4300 meters height (Singh, 1998; Uniyal and Uniyal, 2001).

Cultivation, Harvesting and Yield

Sea buckthorn grows well in almost all soils ranging from sandy, sandy loam, rocky, sand dunes, ravine and also on banks of rivers. It also grows in wasteland soils which have poor fertility status and also in saline and alkaline soils with pH value of 8.7 or even more (Rongsen, 1992). It has been found growing in cracks of mountains/rocks. However, for its commercial cultivation and good growth, a well-drained, deep (5-8 m) sandy loam soil rich

in organic matter is recommended. Its extensive deep root system, root nodules and biomass production make it ideal for wasteland development, soil reclamation and improvement programmes.

Nutritional Value of Sea buckthorn Fruits

Sea buckthorn berries are among the most nutritious and vitamin-rich fruit found in the plant kingdom. The vitamin C content (Table 1) of sea buckthorn fruit (Fig.1) was 516 mg/100g and this concentration of this vitamin was found to be higher than in orange (40.80 mg), papaya (15.67 mg), apple (3.90 mg)/ 100 g and also higher when compared to various other fruits (Chauhan et al., 2001; Meenakshisundaram Selvamuthukumaran and Farhath Khanum, 2014). The carotenoids content (Table 1) of sea buckthorn fruit was 6.8 mg/100 g and the content was higher when compared with fruits viz., papaya (0.24 mg), orange (0.21 mg) and in apple only trace amount was found (Chauhan et al., 2001; Meenakshisundaram Selvamuthukumaran and Farhath Khanum, 2014).

Medicinal Value

All parts of the plant viz., bark, leaves and fruits are rich in biomolecules with unique medicinal values (Fig.2). The array of biomolecules synthesized by sea buckthorn has imparted a central role to the plant not only as a health promoter but also for prevention and treatment of different diseases. The medicinal value of sea buckthorn is well documented in Asia and Europe. Investigations on modern medicinal uses were initiated in Russia during the 1950's (Gurevich, 1956; Akulinin, 1958). In India it has been identified as Amalavetas, an ayurvedic plant.

Some of the Studies in the Medical Applications of the Plant are listed below:

Treatment for Tumors and Cancers

Research in the late 1950's and early 1960's reported that 5-hydroxytryptamine (Tryptophan) isolated from sea buckthorn bark inhibited tumor growth (Pukhalsskaia, 1958; Sokoloff et al., 1961; Li and Liu, 1991). The vitamins, flavonoids and phenols isolated from the fruits of sea buckthorn can curtail progression of cancer (Peizhen et al., 1989; Cheng, 1992). Sea buckthorn products based on fruit pulp or juices contain more phytochemicals and therefore they are considered to have therapeutic and chemo preventive benefits (Li and Liu, 1991; Cheng, 1992). Sea buckthorn juice is known to block the endogenous formation of N-nitroso compounds more effectively than ascorbic acid and thereby prevents tumor production (Li and Liu, 1991).

Treatment for Ulcers

Hippophae is traditionally used in the treatment of gastric, duodenal ulcers and laboratory studies confirm the efficacy of the seed oil for this application (Zhou Yuanpeng, 1998; Pentegova, 1983; Xing et al., 2002).

Treatment of Wound Healing and Burns

The plant is used to prevent sunburn protection and used as an emollient in preventing skin wrinkles of eye region. The sea buckthorn oils are recommended for external use in the case of burns, bedsores and other skin complications induced by confinement to bed or treatment with X-ray or other types of radiation (Pentegova, 1983; Zhang et al., 1988). Palmitoleic acid a constituent of the oil and being a component of skin tissue and therefore the oil can be considered as a valuable topical agent in treating burns and healing of wounds. This fatty acid can also nourish the skin if adequate quantities of sea buckthorn or its oil are consumed.

Liver and Pulmonary Ailments

The sea buckthorn extracts have been found to normalize liver enzymes, serum bile acids and immune system markers involved in liver inflammation and degeneration (Gao et al., 2003). Its other useful pharmacological potential includes hepatoprotective properties (Cheng, 1992).

For Improving Immunity and Cardiovascular Problems

Leaves and fruits of sea buckthorn also have a significant immunomodulatory activity as oxidant induced lymphocyte proliferation and interleukin production could be curtailed when the cells were treated with sea buckthorn extracts (Geetha and Sawhney, 2004). Flavonoids and phenols isolated from the fruits of sea buckthorn have been demonstrated to improve immunity. The fruit of sea buckthorn possess strong antioxidant activity and has potential for development of herbal drugs against heart diseases.

For Age Related Problems

Sea buckthorn has also been found to be effective in prevention and management of different age related problems particularly senile dementia (Agarwal, 2001). The drug developed from this plant significantly arrested the loss of acetylcholine level among the elderly people.

Value Added Products from Sea buckthorn

In Europe sea buckthorn juice, jellies, liquors, candy, vitamin C tablets and ice cream are readily available (Wolf and Wegert, 1993; Bernath and Foldesi, 1992; Morzewski and Bakowsk, 1960). It is also used in Eastern Europe as a food colorant and a fabric dye. Examples of commercial products available in other countries are: 'Biodoat' in Austria; 'Exsativa' a vitamin supplement in Switzerland; sea buckthorn syrup in France; liqueurs in Finland and 'Homoktovis Nektar' an apple based fruit juice in Hungary. Fruit drinks were among the earliest sea buckthorn products developed in China.

Conclusions

The development of antioxidant rich value added products from underutilized fruit could have enormous applications in the food industry as well as human health apart from conserving a large bioresource. This review will find way for developing health foods, which can form a ready reckoner to entrepreneurs and the products developing from such fruit can be prescribed /utilized for general health and wellbeing of humans. The products can also be viewed as stress busters since these have considerable amounts of antioxidants. Thus this review is an attempt to utilize an excellent gift by nature to mankind.

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