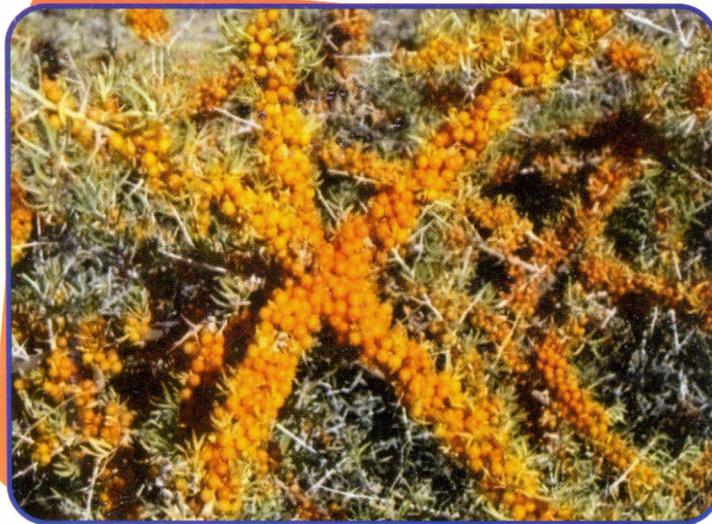


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SEABUCKTHORN IN LADAKH

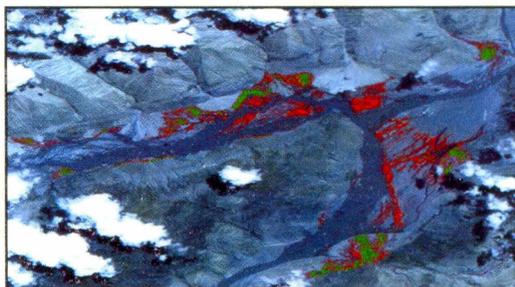


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The actinorhizal plant seabuckthorn (*Hippophae rhamnoides* L.) of the family Elaeagnaceae has the unique characteristics to grow in marginally fertile soil of cold desert. It is naturally distributed over 11,500 hectares in Ladakh region. The shrub can withstand extreme temperature from -43°C to +40°C and is considered drought resistant. These two characteristics make the shrub an ideal plant species to establish in cold deserts. Besides the cold and drought resistance, the shrub is among the first plant species that can grow in any barren land. Establishment of seabuckthorn plantation led to improved soil fertility and moisture conservation leading to shrub-grass community of thick forest after 4-5 years. Roots of seabuckthorn have symbiotic association with bacterium belonging to genus Frankia. The symbiotic association fixes atmospheric nitrogen in soil thereby increasing soil fertility of nutrient deficit soil in deserts. It is estimated that seabuckthorn plantation fix 180 kg nitrogen per hectare every year.



Nutritional Value:

An interesting fact of seabuckthorn is that there is separate male and female plant. Only the female plants bear yellow, orange or red berries that ripen in August-September. The berries are among the most nutritious fruits. Concentration of vitamins A, B2 and C of the berries is much higher than other fruits and vegetables such as orange, carrot and tomato. Vitamin C content ranges from 200-2500 mg/100g berries, which is higher than many other vitamin rich fruits like amla, orange, kiwi etc. Thus the berries are storehouse of vitamin in the region where availability of other vitamin rich



fruits is limited. Seabuckthorn berries has a unique characteristic of remaining intact on the shrub throughout the winter months despite of the subzero temperature. Many bird species feed on the berries when other source of food is limited in the region. The leaves serve as protein rich fodder for cold desert animals like sheep, goat, donkey, cattle, double hump camel etc. The thorny and bushy growth of the shrub provides a protective shelter for flora and fauna thereby maintaining the fragile ecosystem of the cold arid region.

Traditional Uses:

Seabuckthorn has been judiciously used by people living in the cold deserts. Due to scarcity of resources, seabuckthorn has been used traditionally for a variety of purposes. Every part of the plant viz. fruit, leaf, twig, root and thorns has been traditionally used as medicine, nutritional supplement, fuel and fence and therefore, seabuckthorn is popularly known as 'Wonder Plant', 'Ladakh Gold', "Golden Bush' or 'Gold Mine' of cold deserts. The agricultural fields are valued the most in the region due to limited cultivable land. Traditionally the dense and thorny shrub is planted around agricultural field and plantation sites to protect against stray animals and pedestrian movement. The dried twigs and branches are also put along the boundary walls of residential houses and fields. Plantation of timber trees like willow and popular is an important activity in cold desert of Ladakh. The cuttings during its initial years need outmost care especially from the stray animals.



To prevent animals from damaging the plants, seabuckthorn branches are tied around the cuttings to serve as tree guard. This practice is effective in increasing survivability percentage of the plants during early stages. Cold deserts are characterized by high wind velocity leading to environmental degradation. Windbreaks made of seabuckthorn are effective at preventing wind erosion in open areas. The shrub can resist



drying effect and physical injuries caused by the wind. The extensive root system of the shrub is ideal for soil binding. In a 10-12 years old plant, root extent up to 537 cm horizontally and 127 cm vertically. Due to extensive root system, seabuckthorn plantation is being done around the water channel to check erosion due to water flow.

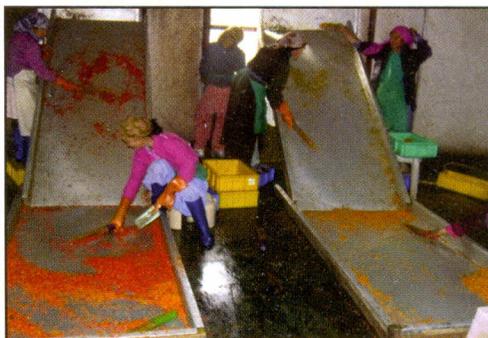
Cold deserts have a typical problem of firewood. On one hand, the region is cold and thus requires fuel wood to keep the houses warm during winter months. However at the same time due to merge forest cover, availability of wood for firewood purpose is a major challenge. Under such circumstances, seabuckthorn stem and branches are being used as firewood. The calorific value of dry seabuckthorn is 4,785.5 calories per kg. The shrub is fast growing and can be stumped after every 3-5 years. Since the shrub grows fast and tolerates repeated cuttings, it reduces the harvesting pressure on other native woody plant species like poplar, willow and juniper. Six-year old seabuckthorn plantation on one hectare can produce 18 tons of firewood which is equal to nearly 12.6 tons of standard coal. The firewood is popular especially in monasteries and during ceremonies where the requirement of high calorific firewood is required. Most monasteries maintain its own seabuckthorn growing areas to ensure regular supply of firewood. Seabuckthorn thus proved to be a popular green plant in the region. Charcoal that remains after burning seabuckthorn is being used by blacksmith. Seabuckthorn stem is hard and often used as handle for agricultural implements.

Seabuckthorn has been used in traditional 'Amchi' system of medicine for centuries in Ladakh. The medicinal value of seabuckthorn was recorded as early as the 8th century in the Tibetan medicinal classic rGyud Bzi (Four Text of Fundamental Tibetan Medicine). Even today Amchies (local traditional doctor) often prescribe preparations from seabuckthorn fruit, seed, root etc. for treatment of common problems like wound healing, blood purification, gastric ulcer etc. The macerated berries are used as a cure for preventing cracking of lips in the dry cold climate. Fruits are used as tonic for malnourished children and pregnant ladies. Modern research has supported the medicinal properties of seabuckthorn.



Income generation:

Seabuckthorn has immense potential to uplift socio-economic condition of the local populace. Studies conducted using satellite imagery by Defence Institute of High Altitude Research and Defence Electronic Application Laboratory has shown that about 11,500 ha of land is under seabuckthorn in Ladakh region. Until August 2001, seabuckthorn was considered a thorny menace by locals due to its profuse suckering nature. The plants are being uprooted due to fear of spread to fertile soil. In India, seabuckthorn has received increasing attention after Defence Institute of High Altitude Research (DRDO) has developed technology for preparing beverage from its highly acidic fruit. The patented technology has been transferred to commercial units, NGOs and local entrepreneurs. The technology is well received by industrialists and ready-to-serve beverage is currently available in Indian market under brand name of 'Leh Berry', 'Ladakh Berry', 'Power Berry' etc. Herbal tea prepared from Himalayan herbs with seabuckthorn leaves as the main ingredient has found wide acceptance among the consumer.



Several other products such as antioxidant herbal supplement, seapricot beverage, seabuckthorn oil soft gel capsule etc are at different stages of development and commercialization. The market for seabuckthorn is expanding and industrialists have shown keen interest in the shrub. Seabuckthorn fruit worth Rs 1.4 crore has been sold in 2007 from Leh district of Ladakh region, which generate employment and rural

income. This account for less than 5% of the region total potential. The demand for fruit is increasing as reflected in the price of its berry from Rs 8/kg in year 2001 to Rs 22/kg in 2010. The shrub is now considered a potential horticultural crop for the region.

Prospects:

Mega projects on seabuckthorn have been initiated by Ministry of Environment & Forests and several R&D organizations in view of its environmental, biotechnological, nutraceuticals, pharmaceutical and socio-economic potential. Traditional usage coupled with commercial value and modern scientific research brings immense benefit to modern society from the lesser known shrub of the Himalayas.

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