

VI. Conclusion

Prospects of Seabuckthorn

The brief review of seabuckthorn presented in this paper establishes a case for the promotion of seabuckthorn as a multipurpose option for fragile and marginal mountain areas. To recapitulate, one may again refer to its important features such as being a source of low-cost vitamins, a rich source of cash income and off-farm employment, and an effective means of slope stabilisation and soil moisture conservation.

Seabuckthorn, as a multipurpose plant, has been used in different fields, but its potentials are far from fully exploited. With further study, more and more uses could be developed in the near future.

As a Source of Low-priced Vitamins

Being a source of abundant amounts and varieties of vitamins is one of the remarkable characteristics of seabuckthorn (see Table 1). Because seabuckthorn (all species) bushes are always distributed throughout the cold, dry, and poor mountain areas which, in most cases, are not suitable for common fruit trees and vegetables, it can provide plentiful, low-priced vitamins for the people living in remote areas. For example, in Western Sichuan, China, the Tibetan herdsmen who live at high altitudes often collect fresh seabuckthorn (*H. tibetana*) berries to eat.

The most important thing is that seabuckthorn fruit is a plentiful source of Vitamin A. According to Pokhrel (1989), the latest medical research has proven that Vitamin A deficiency is not only the major cause of impairment of vision but also causes slow growth and increased vulnerability to metabolic disturbances. Referring to health problems caused by dietary deficiencies, the lack of vitamin A can be singled out as an acute problem in most of the developing countries. The latest available statistics reveal that the annual mortality rate of 150,000 pre-school children is a result of vitamin A deficiency alone. It is estimated that there are about 5 million children worldwide affected by vitamin deficiency. Of this number, 250,000 children are

rendered blind each year in Asia alone. In Nepal, it is estimated that 15,000-20,000 child deaths can be prevented each year by increasing the intake of Vitamin A.

Seabuckthorn fruit oil is very rich in carotene (one carotene unit can be decomposed into two Vitamin A units) (see Table 2). According to Zhang Fushuan et al. (1987), some pulp oil (*H. rhamnoides L.*, subsp. *turkestanica*) from Xinjiang, China, contains carotene of up to 9265.5 mg/100g. There is a strong potential for the use of seabuckthorn oil in land-locked developing countries such as Nepal instead of cod-liver oil for treating Vitamin A deficiency.

As a Source for Generating Cash Income

Traditionally, farmers who live in the high mountains or remote areas have very narrow options for growing cash crops for additional income, since the weather and soil conditions are not suitable, or transportation constraints hinder the development of commercial production. That is one of the reasons why people living in remote areas are poorer than people living in the plains. Since the economic value of seabuckthorn has been revealed, people living in remote areas have found that the indigenous wild plant could bring them considerable income. For example, since 1985, in the middle reaches of the Yellow River, farmers have been earning about 1.06 million U.S. dollars from seabuckthorn fruit every year.

In the Hindu Kush-Himalayan Region, there is a tremendous amount of wasteland, especially on high altitude river terraces and dry river beds where soils are often gravelly, sandy, and lack organic matter, and where the weather is often cold, dry, and windy. Usually these lands are not suitable for ordinary farming or crop planting, but they are suitable for establishing seabuckthorn plantations. In fact, after the establishment of seabuckthorn plantations, local farmers may quickly reap benefits. For example, in Jianping County, Liaoning Province, since 1986, the farmers have been earning 400,000 US\$ every year from seabuckthorn collected from newly established forest. This income does

not include the other benefits accruing from the by-products of the seabuckthorn forest.

Usually, softwood cutting is an effective propagation method needing artificial mist sprays and a plastic film house with As an Option for Stabilising Mountain Slopes

In the Hindu-Kush-Himalayan Region many roads need to be cleared every year, and stabilisation of mountain slopes to maintain roads year round is a priority. In order to meet this aim, selecting appropriate plant species to cover the mountain slopes is an important biological engineering measure. There are many species with wide ecological amplitudes which can be successfully planted over a wide range of climatic conditions and which can grow on the mountain slopes as well, but such species may not be accepted or adopted by engineers and farmers because they are of insufficient economic value.

Plant species that are capable of fixing nitrogen, are good soil binders, provide good surface cover, and can be significant as fodder, food, fuelwood, and medicinal plants are particularly favoured by planners and farmers. Seabuckthorn, perhaps, is just the kind of plant needed. When people understand and recognise the value of seabuckthorn, its appearance in roadside plantations in the HKH Region will be probable.

Seabuckthorn has its own limitations. For example, most species of *Hippophae* originate from temperate zones and may not adapt to a tropical or subtropical climate. Many species have too many thorns on the stems, so it is very difficult to pick the fruit and harvest it by machine. On the other hand, too many thorns provide an obstacle to sheep and cattle grazing.

However, the big challenge is the spreading and harnessing of this plant in different areas. In this respect, we may highlight some of the circumstances positively associated with the prospects of seabuckthorn, particularly in the HKH Region.

Experiences with Seabuckthorn in Three Countries

Until now, natural seabuckthorn bushes have only been found in Europe and Asia. According to the available literature, seabuckthorn (including all species and sub-species of *Hippophae* L.) is scattered throughout Norway, Sweden, Finland, the former USSR, Denmark, Poland, Germany, the Netherlands, Belgium, France, England, Ireland, Spain,

Switzerland, Austria, Italy, Yugoslavia, Hungary, Romania, and Turkey in Europe, and Iraq, Iran, Afghanistan, Pakistan, India, Nepal, Bhutan, Mongolia, and China in Asia. About 30 countries in the world have been found to have natural seabuckthorn forests (see map on page 7).

From the map, it can be seen that seabuckthorn is distributed from several masl in Scandinavia to 5,000 masl in Tibet and it is found from the wet seashores to the arid plateaux. It suggests that seabuckthorn can adapt to widely varying ecological environments. However, the largest area of natural seabuckthorn forest is concentrated in China. The other two big producers of seabuckthorn are the former USSR and Mongolia (See Table 21).

The status of seabuckthorn exploitation in the former USSR has been discussed in Chapter 3. From Table 21 it can be seen that, in 1982, the former USSR had 47,205 ha of seabuckthorn forest and could harvest about 4,200 tons of fruit. Despite the fact that the former USSR is the second largest producer of seabuckthorn products, because of its huge domestic demand, neither the area nor the yield of seabuckthorn will meet the increasing requirements for a long time.

In China, seabuckthorn has provided a breakthrough in harnessing water and soil losses in north and northwest China, and it has generated remarkable benefits both for farmers and entrepreneurs, leading to its acceptance both by the public and the Government. The priority given to investment by the Government emphasises the resource bases of seabuckthorn. Now the total area of seabuckthorn has increased from 667,000 ha (1985) to about 1,000,000 ha (1990). The total value of seabuckthorn products has reached more than 20 million US \$ (1990).

According to the Plan of the Chinese National Seabuckthorn Office, from 1991-1995 more than 333,000 ha of seabuckthorn forest will be established in China, most of which will be concentrated in Shaanxi, Xhaanxi, Gansu, Lianing, Inner Mongolia, Qinghai, and Ningxia provinces.

Mongolia is the third largest producer of seabuckthorn in the world. It has 29,000 ha (natural and cultivated), mainly located in the Ubsunuur (accounting for 45%), Central, Oriental, Selenge, Dzarhan, Koldo, and Hovsgol provinces.

The fruit of seabuckthorn is a favourite berry of the Mongolian people and seabuckthorn oil is used in Mongolia as a medicine and health food.

Table 21: Seabuckthorn Resources and Their Distribution in USSR, Mongolia, and China

Distribution Region	Seabuckthorn Area (hectare)			Possible Harvested Yield (ton)
	Natural	Cultivated	Total	
USSR (1982)				
Russian S.F.S.R.	13,970.0	3,480.0	17,450.0	2,230.0
Georgian S.S.R.	400.0	30.0	430.0	50.0
Armenian S.S.R.	-	1,000.0	1,000.0	200.0
Azerbaijan S.S.R.	7,300.0	10.0	7,310.0	400.0
Uzbekistan S.S.R.	1,230.0	40.0	1,270.0	200.0
Tajikistan S.S.R.	2,860.0	600.0	3,460.0	300.0
Kirghizian S.S.R.	4,990.0	20.0	5,010.0	300.0
Kazakhstan S.S.R.	10,270.0	-	1,0270.0	500.0
The Other S.S.R.	30.0	975.0	1,005.0	20.0
Total	41,050.0	6,155.0	47,205.0	4,200.0
Mongolia (1990)				
Ubsunuur Province	12,680.0	370.0	13,050.0	1,174.0
The Other Provinces	15950.0	-	15,950.0	986.0
Total	28,630.0	370.0	29,000.0	2,160.0
China (1990)				
Shanxi Province	313,333.3	20,000.0	333,333.3	139,000.0
Shaanxi Province	125,466.7	33,200.0	158,666.7	66,000.0
Gansu Province	143,333.3	26,666.7	170,000.0	11,000.0
Liaoning Province	-	124,666.7	124,666.7	15,000.0
Qinghai Province	53,200.0	27,466.7	80,666.7	15,400.0
Inner Mongolia A.R	14,533.0	61,660.0	76,133.3	3,500.0
Xinjiang A.R	33,333.3	-	33,333.3	13,300.0
Hebei Province	25,866.7	2,133.3	28,000.0	5,000.0
Sichuan Province	26,666.7	-	26,666.7	11,600.0
Other Provinces	4,933.3	1,466.7	6,400.0	1,500.0
Total	740,666.6	297,200.1	1,037,866.7	281,300.0

Source: 1. USSR, N.T. Koykov, 1985
 2. Mongolia, Huang Quan et al. 1990
 3. China, Lu Rongsen, 1991 (Data are collected from various Chinese literature)

The fresh fruit and products do not always meet market demands, and sometimes products are sold without entering the retail market. The Mongolian Government has paid a lot of attention to developing seabuckthorn forests because of the plant's multiple uses for foods and medicines, for controlling soil and water losses, and for afforestation in and around the cities. By 1995, the existing 370 ha of cultivated

seabuckthorn plantation will be extended to 1,000 ha and by 2,000 A.D. more than 3,000 ha of seabuckthorn plantation will have been established.

For other countries, comparable statistical details are not available. However, a few small-scale explorations sponsored by ICIMOD (which are still in progress) indicate

substantial areas of seabuckthorn in Nepal, India, and Pakistan. Thus, seabuckthorn is not a new thing for the HKH Region. However, unlike China, other countries of the HKH Region have hardly done anything to promote seabuckthorn. The real value of this review, illustrating mainly the Chinese experience with seabuckthorn, is to generate awareness and induce action in other parts of the HKH Region.

Demonstration of Potential

The important lessons from Chinese experiences relate to (i) a large-scale plantation of seabuckthorn (including by air-seeding) as a part of resource conservation strategy for fragile slopes; (ii) conversion of wild plantations into a managed system to enhance productivity of seabuckthorn (including by changing the ratio of male-female plants and by introducing methods of easy harvesting and processing of seabuckthorn fruits); and (iii) development of processing technologies for different seabuckthorn products and establishing processing units and marketing channels for them. All this has helped to generate high cash incomes and comparative advantages for seabuckthorn producing areas.

Strategies

To facilitate the spread and harnessing of seabuckthorn based on Chinese experience, the strategy needs appropriate steps. They include the steps listed below:

- (i) generating awareness;
- (ii) field exposure and training; and
- (iii) establishment of demonstration units involving experts from China and other countries.

To, at least, partially meet the above requirements, ICIMOD has initiated a few activities. They include:

- (i) preparation of a video film with Chinese cooperation to generate awareness about seabuckthorn;

- (ii) the visit of a mission from the Chinese Office of Seabuckthorn to ICIMOD; their visit to seabuckthorn growing areas in Nepal; exhibition of over a dozen seabuckthorn products; a business seminar involving Chinese experts and experts from other countries, (mainly from Nepal);

- (iii) plans for training selected people from different HKH countries through field visits to China in 1992; and

- (iv) other initiatives, including R&D and processing technologies, which will form part of the follow-up to the above-mentioned training phase.

The Under-utilised Potential

The above discussion summarises the commercial potential of seabuckthorn and the experiences of China and the former USSR in harnessing the same. However, in other parts of the world, even when seabuckthorn is available as a native plant, the degree of its utilisation is far below that of these two countries and Mongolia, which also has large seabuckthorn plantations.

We conclude this section by referring to the use of seabuckthorn in other countries which (when contrasted with China and the former USSR) might give an idea of the vast potential of seabuckthorn, which remains under utilised. It will also increase the awareness about seabuckthorn potential in different countries.

Today, the largest seabuckthorn plantations are in the former USSR, Mongolia, and China, but more and more countries are establishing trial plots or growing this plant for different uses. Many countries, such as those of the Hindu-Kush-Himalayan Region, have rich resources but do not use them on a commercial scale. Along with dissemination of knowledge about seabuckthorn, it is believed that the HKH countries could establish more experimental plantations under cultivation for their own purposes.