

## **Nutritional Components and Nitrogen Fixation in Seabuckthorn (*Hippophae rhamnoides* L.)**

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### **Abstract**

Seabuckthorn (*Hippophae rhamnoides* L.) is an underutilized plant, apart from in China and some European countries where seabuckthorn production is comparatively popular. Seabuckthorn is a small fruit tree in the family Elaeagnaceae that originated in central Asia. Seabuckthorn could be valuable for nutrition, health, and environmental sustainability because its fruit is rich in vitamins and it is a symbiotic fixer of nitrogen. Seabuckthorn could also be valuable for food security and income generation because it is stress tolerant and is used for some processed products. We compared the nutritional components of the fruit of two subspecies: *H. rhamnoides* ssp. *mongolica* and ssp. *rhamnoides*. The mature fruit of both subspecies of seabuckthorn contained high levels of beta-carotene, which is provitamin A, and alpha-tocopherol (vitamin E). The beta-carotene and alpha-tocopherol contents were greater in the fruit of ssp. *mongolica* than in ssp. *rhamnoides*. Seabuckthorn fruit also contained high levels of L-ascorbic acid (vitamin C). Sugars and acids that are important in fruit flavor were also measured in both subspecies. We further focused on symbiotic nitrogen fixation and stress tolerance, which could facilitate extensive sustainable cultivation. Actually, seabuckthorn is useful for the greening of poor land and deserts. Seabuckthorn root nodules showed high nitrogen fixation activity, similar to that in *Rhizobium*-legume root nodules. Even under nitrogen-free conditions, seabuckthorn plants with root nodules grew normally. The morphology of the root nodules and the 16S ribosomal DNA sequence showed that the root nodules were formed by *Frankia*, which belongs to the elaeagnus group. We are currently evaluating the tolerance to drought and temperature stress. Our work will help to promote the breeding and cultivation of seabuckthorn for the benefit of humankind and the environment.