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Testing Seaberry as an Alternative Crop in Nevada

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Introduction

The testing and marketing of alternative crops is an important task given that 92% of the crops currently produced in Nevada are forages that require large amounts of water. Producers recognize this and consistently rate alternative crop programs as a critical need for the States agricultural industry. In the latest needs assessment conducted in Churchill County, respondents rated the testing and marketing of alternative crops as the two highest needs respectively, for agriculture (SP 04-15). This fact sheet discusses one of several crops currently being tested in Extension's Alternative Crop Testing program.

Seaberry or sea buckthorn is called "Siberian pineapple" in Russia, because of the juice that is produced from the berries. It has been produced for centuries in Europe and Asia as a food and medicine source. The first commercial factory processing seaberry was established in Russia in 1940. Since then China has become a leading producer with over two million acres in production, with about 200 processing factories producing more than 200 products. Canada, Germany, Japan, and several northern European countries are working with seaberrys as a potential crop.

Seaberry Description

Seaberry or Sea buckthorn (*Hippophae rhamnoides*) is a hardy, deciduous shrub, native to central Asia. It is similar in appearance to Russian olive or silverleaf buffaloberry. Seaberry grows about 10' to

15' tall, and almost as wide. It produces numerous, thorny branches. The thorns are needle-like, growing to 3/4 inches in length, (Figure 1). The leaves are narrow, light grey to green on top and silver-grey below. They grow alternately along the stems. The bark is rough, and brown or silvery in color. The flowers are very small, yellow, and are produced before the leaves appear. Seaberries produces an abundance of yellow-orange to red berries along stems that are at least 2 years old. The fruits are about 0.3 inches long and 0.2 inches in diameter. They remain on the stems the entire winter.

There are numerous named varieties available with more currently under development. Named varieties normally produce higher fruit yields, have fewer thorns, and are widely adapted for production.



Figure 1. Needles on Seaberry Plant.

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Uses for Seaberry products

Ancient Greek scholars wrote that the leaves and small branches of seaberry were added to the diet of horses to improve their weight gain and to make their coats shiny. The Latin name of seaberry was derived from Hippo (horse) and phaos (to shine).

It is currently used as a food source because the berries contain levels of vitamins and nutrients unsurpassed by other species of fruit. Russian cosmonauts took seaberry juice into space and used the cream to protect against cosmic radiation. It is used in medicinal products to heal skin problems and in cosmetics to improve the user's appearance. Research using bark extracts indicate it may inhibit tumor growth.

The plants are widely used as windbreaks, shelter belts, and ground cover to protect soils (Figure 2). Wildlife species throughout the world are dependent on seaberry for food and cover.



Figure 2. 18 month old Seaberry in trial.

Desired growing conditions

Seaberries are very hardy plants that survive temperatures as low as -40 degree F. They thrive in slightly acidic to neutral, sandy loam soil, but will grow well in alkaline to acid soil. Soil organic matter benefits seaberry production. Seaberry plants are very drought tolerant but production suffers if the soil is too dry when fruit is forming.

Seaberry plants remove nitrogen from the air and add it to the soil. Excessive nitrogen fertilization can reduce this process. Seaberries respond well to adequate nutrient levels in the soil and like most crops, production will fall if nutrients are lacking.

Few serious vertebrate pests, insects or disease problems have been reported on seaberries. While not pest free, production is relatively unaffected.

Seaberry cultivation

Seaberry can be transplanted from containers or planted as bareroot stock. Direct seeding can occur in the spring or fall. In Nevada, it must be irrigated immediately after planting and thereafter.

Research in Canada reveal that seaberry grown for shelterbelts is normally planted approximately 3 feet apart in rows, with minimum of 12-15 feet between rows. Rows should be oriented in a north-south direction to maximize exposure to sunlight. When planted as an orchard it is spaced like apple trees growing on dwarf rootstocks.

The female plants require pollination from male plants to produce fruit. The flowers are wind pollinated and there should be no more than 8 female plants planted for each male plant in the orchard. The males should be planted upwind from the females.

Production will be improved by moderate annual pruning. Long branches should be headed back to encourage side branching, while crossing branches should be removed.

Potential Values and Markets for Seaberry Crops

The Canadian government agency, Agriculture and Agrifood Canada, is attempting to develop a viable and stable market for the crop. Their Pacific Agrifood Research center recently developed a processing plan for seaberry that recommended separating the berries into 5 basic components. They include; 1) juice, 2) pulp-oil, 3) powdered nutrient supplement, 4) seed oil, and 5) animal feed.

Current estimates from Canada indicate that the North American demand for processed seaberry oil is in the neighborhood of 22,000 pounds per year. This equates to nearly 3.5 million pounds of fresh berries yearly. European demand is currently exceeding supply and an additional 220,000 pounds of berries is needed to meet the demand.

Information reported from Canada in 2003 estimated values of fresh berries ranged from \$1.36 to \$4.54 Canadian per pound. Picking the berries is

the major cost associated with production. Seaberries are normally hand harvested which is slow and expensive, but machine harvests are becoming more common. Picking machines have been developed that can produce approximately 800 pounds of berries per day per worker, while hand pickers average about 110 pounds per day in high yielding orchards.

While it is very difficult to estimate profitability from a crop such as seaberry some assumptions are possible. Annual yields average approximately 4500 pounds per acre in other locales where it is grown commercially. If berries sell for \$1.36 per pound, gross income would be over \$6000/acre/year. Production costs have been estimated to be about \$0.95 per pound leaving a profit margin of approximately \$1,725 per acre annually. (All figures are in Canadian dollars as the conversion rate to US dollars changes daily).

Nevada Results with Seaberries

Early investigations of this crop indicated that potential profit margins were large enough to justify establishing seaberry test plots in Nevada. Based on the potential returns and the wide adaptability of the plant, a local agricultural producer contacted Cooperative Extension in 2001 for assistance in testing seaberry, in Nevada. A grant application was prepared and submitted to the Specialty Crop Grant Program administered by the Nevada Department of Agriculture. The grant was funded and plants purchased in the late spring of 2002.

The initial trials began in June of 2002 with the planting of 6 varieties in Fallon. Most of the plants died due to the poor quality of the bare root stock received and/or the late planting date. Surviving plants were supplemented with a second planting in April of 2003. The trial was expanded with the planting of 9 varieties in Eureka Nevada at the same time. All the plants in each trial are drip irrigated.

The 6 varieties planted in 2002 included 9 plants each of: “Russian Orange”, “Botanica”, “Hergo”, “Leikora”, “Frugana”, and “Podkra Suda”. In 2003 5 plants each of several other varieties were planted on the same site. They included; “Garden Gift”, “Amber Dawn”, “Titan” “Orange Delight” and male plants with variety not stated (VNS). The Eureka trial was established using 5 plants each of 8 varieties, plus 5 (VNS) males. The varieties planted

in Eureka included; “Garden Gift”, “Frugana”, “Hergo”, “Leikora”, “Titan”, Amber Dawn”, “Orange Delight”, “Hippophoe” and 5 males (VNS). Most of the varieties planted in 2002 had died by the spring of 2003.

Table 1 shows survival results and average height of several Seaberry varieties planted June 6, 2002 and April 23, 2003 in Fallon. Survival and heights were determined during October 2004. Most of the plants were less than 6” in height when planted in 2002 and 2003.

Variety (year planted)	# planted	# alive in 2004	% Dead	Ave Ht. (in)
Orange Delight (2003)	5	3	40	44
Garden Gift (2003)	5	4	20	32
Hergo (2003)	5	4	20	52
Botanica (2003)	5	2	60	54
Botanica (2002)	9	0	100	n/a
Amber Dawn	5	3	40	33
Leikora (2003)	5	4	20	53
Leikora (2002)	9	4	44	50
Frugana (2003)	5	5	0	53
Frugana (2002)	9	9	0	59
Podroka Suda (2002)	9	9	0	51
Titan (2003)	5	1	80	49
Male Plants (2003)	5	5	0	40

Table 1. Survival results and average heights for several Seaberry varieties planted in Fallon June 6, 2002 and April 23, 2003.

Table 2 shows mortality and average height of several Seaberry varieties planted April 20, 2003 in Eureka, Nevada.

Variety	# Planted	# Alive 2004	% Dead 2004	Ave. Ht. (in)
Garden Gift	5	2	60	26
Frugana	5	2	60	23
Hergo	5	1	60	23
Leikorn	5	2	60	43
Hippoph	5	2	60	31
Titan	5	2	80	33
Amber Dawn	6	2	66	36
Orange Delight	5	0	100	0
Males (VNS)	5	2	60	37

Table 2. Survival results and average heights for 9 Seaberry varieties planted in Eureka April 20, 2003.

Conclusions

As with most crops, some varieties of seaberry are much better suited to an area than others. In this case, “Frugana”, “Podkra Suda” and Leikora, suffered the lowest mortality rates of the varieties tested. “Botanica”, “Titan” and “Orange Delight” experienced the highest losses. The Eureka plantings generally faired worse than the Fallon plantings with no variety experiencing less than a 60% rate of loss. The plants growing in Fallon also were generally taller and more robust than the Eureka plants. This is as expected because the Fallon site has significantly more growing degree days than Eureka. The data so far indicates that seaberries can grow in Northern Nevada. However, bareroot plants must be planted in early spring and all are susceptible to the region’s harsh growing conditions.

The current trial will continue with limited fruit harvests possible in 2005. It may be expanded with the planting of additional varieties in the spring of 2005. Readers are encouraged to contact the authors for sources of seaberry plants and to discuss the project in more depth.

Resources used to prepare this Fact Sheet.

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