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**Technical Standard of International Seabuckthorn Association**

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# 沙棘种植园建设与管理技术规程

## Technical regulations for cultivation and management of seabuckthorn plantations

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# Content

# Introduction

This standard is drafted in accordance with the provisions of this standard in accordance with GB/T 1.1-2020 Standardization Work Guidelines Part 1: Rules for the structure and Drafting of standardization Documents.

This standard is compiled by the International Sea Buckthorn Association.

The drafting unit of this standard: Liaoning Dryland Agriculture and Forestry Research Institute, Sea Buckthorn Development and Management Center of Ministry of Water Resources (Soil and Water Conservation Plant Development and Management Center of Ministry of Water Resources), Shanxi Academy of Forestry and Grassland Sciences, Rural Revitalization Science and Technology Institute of Heilongjiang Academy of Agricultural Sciences, Shenyang Agricultural University, Beijing Dongye Hongtai Ecological Technology Co., LTD., Beijing Lin Fengyuan Ecological Environment Planning and Design Institute Co., LTD., Gaoyuan Shengguo Sea Buckthorn Products Co., LTD., Shanhelin (Beijing) Soil and Water Conservation Technology Co., LTD., Chengde Yuhangren Alpine Plant Application Technology Co., LTD., Heilongjiang Bameantong Forestry Bureau Co., LTD., Shanxi Songjiagou Functional Food Co., LTD., Heilongjiang Zhongyuan Dongguo Sea Buckthorn Development Co., LTD., Jilin Jilong Northeast Sea Buckthorn Industry Co., LTD., Inner Mongolia Desert Flower Ecological Industry Co., LTD.

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## 1 Range

This standard specifies the terminology and definition of seabuckthorn plantation, the environment of origin, varieties and seedlings, garden construction, field management, tree management, pest control, fruit harvesting and post-harvest treatment and other technical requirements.

This standard is applicable to the cultivation and management of seabuckthorn plantations.

## 2 Normative reference documents

The following documents are essential for the application of this standard. For dated references, the date-only version applies to this document. For undated references, the most recent version (including all amendment orders) applies to this standard.

GB/T 23234-2009 Chinese sea buckthorn fruit quality grade

GB 5084-2021 Water quality standard for farmland irrigation

GB 15618-2018 Soil Environmental quality Agricultural Land Soil pollution risk control standard (Trial)

GB/T 8321.8-2007 Guidelines for the Rational Use of pesticides (8)

SL 284-2003 Sea buckthorn seedlings

SL350-2006 Technical Regulations for ecological construction engineering of sea buckthorn

NY/T 391-2021 Environmental quality of green food origin

NY/T 393-2013 Guidelines for the use of pesticides in green foods

DB15/T 1891-2020 Technical Regulations for the cultivation of sea buckthorn

## 3 Terms and Definitions

### 3.1 Sea buckthorn Plantation

With the main purpose of producing sea buckthorn fruit, the economic forest of sea buckthorn was established by scientific planting method and managed by highly intensive management.

### 3.2 Russian Sea buckthorn

It mainly refers to the varieties of sea-buckthorn selected and bred from the subspecies of *Hippophae rhamnoides L. subsp. mongolica* Rousi. Compared with *Hippophae rhamnoides* L. subsp. *sinensis* Rousi, it has the characteristics of large fruit, long fruit stalk and fewer thorns.

### 3.3 Chinese sea buckthorn

Chinese sea buckthorn (Hippophae rhamnoides L. subsp. sinensis Rousi) is the most naturally distributed subspecies in China, with strong adaptability and rapid growth. The wild type has many spines.

### 3.4 Hybrid sea-buckthorn

The excellent varieties obtained by interspecific hybridization of *Hippophae rhamnoides* L. subsp. *sinensis* Rousi and *Hippophae rhamnoides L. subsp. mongolica* Rousi have the characteristics of rapid growth, high fruit yield and strong stress resistance.

## 4 Origin environment

The ecological environment of the origin shall meet the requirements of GB 5084, GB 15618 and NY/T 391.

## 5 varieties and seedlings

### 5.1 Plant varieties

According to the principle of suitable varieties in suitable places, the excellent varieties of big fruit sea buckthorn, hybrid sea buckthorn and Chinese sea buckthorn were selected for garden construction.

### 5.2 Seedlings

The vegetated seedlings with hard or tender cuttings reached the standard of Grade I seedlings stipulated in SL 284-2003.

## 6 Plantation Establishment

### 6.1 Site selection

Sea buckthorn plantation should be selected as far as possible in the flat terrain or gentle slope, slope < 15°, soil texture to sandy loam or loam is appropriate, soil PH < 8, salt content < 1%, thickness above 0.5 m. The flat land should be able to drain waterlogging, and the areas with an average annual precipitation of less than 400mm should have irrigation conditions. In order to

facilitate operation and management, the slope land with conditions should be built into horizontal terraces.

### 6.2 Land Preparation

Before planting, prepare the land, remove residual roots, stones, and level the land. The horizontal planting line is generally north-south, the slope is planted along the contour direction, and the trench or planting hole is dug according to the designed plant row distance. When the trench is opened, the upper mouth width is 60cm, the lower mouth width is 30cm, and the depth is 30cm. The size of the planting hole is 30cm × 30cm × 30cm.

### 6.3 Planting density

According to the characteristics of sea-buckthorn varieties planted, site conditions and mechanized operation methods, the general planting density is 2.0-3.0m plant spacing and 3.0-5.0m row spacing. The planting density of the plots with good site conditions and irrigation conditions can be appropriately smaller, and the planting density of the plots with poor site conditions is larger.

### 6.4 Male plant configuration

Male plants are allocated according to the ratio of 8:1, 9:1, or 10:1, and the allocation mode is mainly point-like distribution or determinant distribution, and the distribution is uniform. In order to facilitate the production management such as harvesting and pruning, the determinant allocation mode is adopted as far as possible, that is, every 8-10 rows of female plants are allocated 1 row of male plants. One or two rows of male plants can be planted around the seabuckthorn garden, especially in the upwind direction during the flowering period, as protection rows.

### 6.5 Planting time

In order to improve the survival rate, the seedling planting time should be mainly in spring, and it is appropriate to plant in spring from the soil thawing to the seedling germination.

### 6.6 Planting method

Before planting, the roots of the seedlings should be pruned to keep the root length of 10 to 15 cm. When planting, the seedlings should be straightened to make the roots stretch and do not root. Then, the topsoil mixed with organic fertilizer should be backfilled by layers, the core soil of the upper layer should be backfilled, and the soil should be backfilled to the upper 2 to 3 cm of the

root mark of the seedlings. Then cover its surface with a layer of loose floating soil, where conditions can be in the planting hole or planting trench covered with a layer of mulch moisture and warming.

## 7 Field Management

### 7.1 Fertilization

7.1.1 Base fertilizer

In the preparation of the field, the base fertilizer is applied, and the amount of application is 22.5 ~ 60 t/hm2. After fertilization, it should be deeply turned and mixed.

7.1.2 Topdressing

From May to June every year, 100 ~ 150 g/ plant of phosphorus and potassium fertilizer was applied in trenches or holes, and the depth of topdressing was 20 ~ 30 cm. Or spray 0.3% ~ 0.5% urea solution in the rapid growth stage of the branches, spray 0.2% ~ 0.3% potassium dihydrogen phosphate solution in the expansion stage, spray time before 10:00 am or after 16:00 PM.

### 7.2 Irrigation

When the field water capacity of the plantation soil is 60% in sandy loam, 70% in medium clay and 80% in heavy clay, irrigation should be timely to meet the normal growth of sea buckthorn. If there are irrigation conditions, water should be injected in time before germination, before flowering, before fruit expansion and before freezing. The irrigation method can be mobile pipe irrigation or trench irrigation, and water-saving irrigation methods such as dropper and sprinkler irrigation can also be used. The low-lying garden should discharge water in time during the rainy season to avoid waterlogging.

### 7.3 Weeding

The young garden can be weeded by mechanical shallow tillage, the depth is 5 ~ 8 cm, and it is carried out 2 ~ 3 times a year in the growing season. After the canopy is shaded, mower is used to weed. Where conditions exist, agricultural grass repellent cloth can be laid between planting rows to inhibit weed growth.

### 7.4 Removing Tillering

After 3 years of planting, the roots will sprout many tillering seedlings, which should be removed in early spring, and tillering can also be removed in combination with tillage and

weeding.

## 8 Tree Management

### 8.1 Young tree stage (1-3 years)

In the young stage, sea-buckthorn is generally not pruned, only the single-stem plants are slightly pruned, and the stem height is > 50cm, so as to promote the germination and branching and the formation of dwarfed multi-stem or single stem plants.

### 8.2 Full fruit period (4 ~ 10 years)

In the full fruiting period of seabuckthorn, the vegetive growth and reproductive growth are balanced by pruning. The pruning requirements are horizontal rather than smooth, leaving the old and leaving the new, and thinning the close branches. Vegetative branches and fruiting branches were selected proportionally, and the ratio of vegetative branches to fruiting branches was 2:3, that is, 2/5 of the fruiting branches were moderately or severely truncated or shrunk, and cultivated into vegetative branches group, and 3/5 of the fruiting branches were selected for bearing results. In the spring of the next year, the fruiting branches of the previous year were truncated or shrunk proportionally to cultivate the vegetative branches group. In summer, the branches with strong vegetative growth can be strengthened and branched by the method of coarding.

### 8.3 Aging Period (more than 10 years)

In the plots with good site conditions, old trees can retract, renew and rejuvenate the bearing branches and backbone branches, cultivate new branches and extend the fruiting period. In the plots with poor site conditions, the old trees can be cultivated in the whole garden, and the height of the stubble is controlled within 5 ~ 15 cm. The stubble is carried out in the dormant period of the trees, and the upright and robust branches are selected and cultivated into new plants after the new branches are started. The plot with good site conditions can also carry out high grafting and changing of the senescent tree according to the needs, replace the varieties, and carry out grafting and updating, and the height of the dry grafting part is generally about 80cm.

## 9. Pest control

### 9.1 Prevention and Control Principles

The prevention and control of seabuckthorn pests and diseases should follow the principle of

"prevention first, comprehensive control", timely observation, good prediction and forecast, agricultural control, physical control and biological control should be the main, chemical control should be supplemented, and the use of pesticides should comply with the provisions of GB/T 8321.8 and NY/T 393.

### 9.2 Preventive Measures

9.2.1 Dry shrinkage disease

To prevent serious mechanical damage to the root system and ground part of seabuckthorn, to block the invasion path of pathogenic bacteria, to strengthen field management, and to remove susceptible plants in time. 60% ~ 75% wettable mancozeb 1000 ~ 2000 times liquid can be continuously sprayed 2 ~ 3 times, 50% wettable carbazim powder 500 ~ 1000 times liquid, sprayed once every 10 ~ 15d, continuous spraying 2 ~ 3 times.

9.2.2 Shrink-leaf disease

From the end of April to the beginning of May, chemical agents imidacloprid, thiacloprid and pyrethroid were sprayed to kill leafhoppers, aphids and other insect transmission agents of Seabuckthorn leaf reduction disease. In areas where conditions permit, biological natural enemies such as Metaria anisopliae or aphid are used for green prevention and control to ensure pollution-free production of sea buckthorn and block the transmission of the disease. Once the disease is found, it can be sprayed with tetracycin or aminooligosaccharide 500 times liquid 1 to 2 times a month from the beginning of May to the middle of August, and once every 15 to 20 days, or it can be sprayed with a combination of tetracycin and aminooligosaccharide 500 times liquid.

9.2.3 Seabuckthorn Moth

Strengthen the field management of the garden, turn the tree in time, remove weeds, and destroy the living environment of overwintering insect eggs. From mid-early May to mid-late August, insect lamps or sea buckthorn moth attractants should be used to trap and kill adult insects in infested gardens. For biological control, a highly specialized strain of Beauveria bassiana can be used for artificial propagation, and a powder containing 10 billion spores per gram can be used for spray or root irrigation after rain. Chemical control can be applied to rhizome with 500 times of permethrin solution and 3% methane-mixed phosphorus powder. We will actively protect and utilize natural enemies such as badger and Ichneumon hirsuta.

9.2.4 Seabuckthorn fly

Strengthen the field management of the garden, and carry out tree turning in autumn and spring irrigation to reduce the survival rate of old larvae and the number of adult insects in spring. During the emergence period of adult insects from early mid-June to early August, armyworm yellow plates were used to trap them. For chemical control, 20% cyhalothrin 2000 ~ 3000 times liquid, 2% abamectin 1000 ~ 1500 times liquid, 0.3% azadirachtin emulsion 2000 ~ 3000 times

liquid can be sprayed 2 ~ 3 times, the interval is 5 ~ 10d.

## 10 Fruit harvesting

### 10.1 Pruning and harvesting

In combination with pruning take pruning (pruning of fruit branches) harvesting. For fruit branches with a fruit grain density greater than 30 grains /10cm, the number of pruned fruit branches should be less than 2/3 of the total number of branches, and the collection should be sequentially collected from the outside of the crown to the inside, and at least 1/3 of the fruit branches should be reserved for tree cultivation.

### 10.2 Knock Vibration

After the fruits freeze in winter (below -20 ° C), spread a sunshade net or plastic sheet under the tree, etc., and beat and shake the fruit branches to collect the fruits. This method is suitable for seabuckthorn varieties that do not fall off in winter after the fruits are mature.

### 10.3 Manual harvesting

For mid-early ripening, large-fruit sea buckthorn with no thorns or few thorns, fruit containers can be held for manual picking, and sunshade nets, plastic sheets and other bedding can be placed under the tree, and the fruits can be directly collected on the bedding, and then centralized collection.

## 11 Postharvest treatment

After harvesting, the fruit must be kept intact, fresh and clean, without normal external water, and classified and graded according to the variety in a timely manner. The packaging, marking, transportation and storage of fruits shall be carried out in accordance with the provisions of GB/T 23234-2009.