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ANALYSIS REGARDING THE ORGANIZAȚION, ESTABLISHMENT, MAINTENANCE AND HARVESTING OF SEA BUNCKTHORN IN PLANTATION

Lavinia Udrea[1], Amalia Gianina Strateanu[2], Mariana Sandu[2] Laurențiu Ciornei[2]
[1]Valahia University of Targoviste, 13, Sinaia Alley, Targoviste, Romania
Email: moise_l74@yahoo.com
[2]Romanian Academy, Center for Studies and Researchers of Agroforestry Biodiversity, Calea 13 Septembrie, no. 13, 5th district, Bucharest, Romania
E-mail: marianasandu47@gmail.com, strateanuamalia.research@gmail.com, laurentiu.ciornei@ince.ro

Abstract

Romania brings its contribution to the European Union through a valuable heritage, with numerous species of plants and animals, some endemic and relict, among them medicinal plants and those with high nutritional value. Romania's geographical position and climate have always offered special conditions for favourable for the culture of fruit trees and shrubs.
Around towns, in familiar gardens, in small spaces around buildings, on walls and trellises, the cultivation of various species of trees and shrubs is a leisure occupation and a source of fruit supply. Fruit trees and shrubs in parks, around houses, on roads and alignments, in addition to aesthetics and fruit production, contribute to improving the climate, preventing and combating environmental pollution.
Hippophaë rhamnoides-Sea buckthorn is a shrub of particular importance, found both in spontaneous flora and in controlled cultures. In Romania, sea buckthorn grows spontaneously in the Subcarpathian area of Moldova and Muntenia.
Depending on the place where it is planted, sea buckthorn can grow as a shrub or tree at a height of 1.5 m to 3.5 m, or even more. In arid areas it can become creeping, being an adaptation to environmental conditions. Sea buckthorn is used in food, medicine, animal feed and forestry. Used in agriculture, buckthorn has a very important role in increasing the winter resistance of bees.
From a nutritional point of view, sea buckthorn has a high content of minerals, vitamins, oils, acids and unsaturated fats, present in the fruits and leaves.
Sea buckthorn fruits have a high content of vitamin E, C and carotenoids with strong oxidative action, which slow down aging. Sea buckthorn oil relieves light medication, heals wounds and skin lesions, burns and speeds up the healing process Considering the special valences in maintaining health and treating some ailments, we must take care of this natural wealth of Romania - buckhorn, and we must not consider it inexhaustible, in order not to disappear especially from the spontaneous flora before our eyes.

Keywords: biodiversity, agriculture, producers, buckthorn, environment

1. INTRODUCTION

Romania brings its contribution to the European Union through a valuable heritage, with numerous species of plants and animals, some endemic and relict, among them medicinal plants and those with high nutritional value. Romania's geographical position and climate have always offered special conditions for favourable for the culture of fruit trees and shrubs.
Through the culture of fruit bushes, important areas of land, such as those on slopes, in the area of the hills suitable for mechanization, some sloping lands in the lowland area, as well as the sandy soils of Oltenia, north-west Transylvania, are capitalized in a very profitable way in southern Moldova.
Around towns, in familiar gardens, in small spaces around buildings, on walls and trellises, the cultivation of various species of trees and shrubs is a leisure occupation and a source of fruit supply. Fruit trees and shrubs in parks, around houses, on roads and alignments, in addition to aesthetics and fruit production, contribute to improving the climate, preventing and combating environmental pollution.
Hippophaë rhamnoides - sea buckthorn is known as white sea buckthorn, white river sea buckthorn, river sea buckthorn, prickly sea buckthorn, blue sea buckthorn.
Sea buckthorn is a shrub of particular importance, found both in spontaneous flora and in controlled cultures.
In Romania, sea buckthorn grows spontaneously in the Subcarpathian area of Moldova and Muntenia.
Depending on the place where it is planted, sea buckthorn can grow as a shrub or tree at a height of 1.5 m to 3.5 m, or even more. In arid areas it can become creeping, being an adaptation to environmental conditions.
Sea buckthorn is a unisexual dioecious plant. The stem is branched, with rigid and sharp spines, with annual shoots ending in thorns. Sea buckthorn roots develop horizontally, reaching a distance of 2-3 m from the bush. In rich soils, the roots also develop vertically, in this case nodules are formed with atmospheric nitrogen-fixing microorganisms. The sea buckthorn plant has a special role in maintaining the health of the soil, helping to enrich the substrate with nitrogen.
It is a plant with fruits, leaves and wood with a rich and varied content of vitamins and substances with a biologically active role.
Sea buckthorn is used in food, medicine, animal feed and forestry. Used in agriculture, buckthorn has a very important role in increasing the winter resistance of bees.
From a nutritional point of view, sea buckthorn has a high content of minerals, vitamins, oils, acids and unsaturated fats, present in the fruits and leaves.
Sea buckthorn fruits have a high content of vitamin E, C and carotenoids with strong oxidative action, which slow down aging (Figure 1). Sea buckthorn oil relieves light medication, heals wounds and skin lesions, burns and

speeds up the healing process Sea buckthorn juice is also successfully used in the treatment of skin diseases, in the prevention of cancer and as an immunostimulatory, in the prevention of adenomas, the treatment of breast cancer, antibacterial, appetite suppressant in cases of obesity, regulator of lipoproteinemia, the treatment of leukaemia and lymphomas, osteoarticular disorders, ENT, digestive inflammations, constipation, urinary and genital disorders, haematological disorders, viral disorders, nervous and mental system disorders.



Figure 1. Fruits and sea buckthorn oil

With these extraordinary qualities and properties, the sea buckthorn that grows in Romania stands out once again as one of the most valuable medicinal and food plants in the whole world.

2. MATERIALS AND METHODS

Sea buckthorn is a plant that includes a wide range of uses, it has a special nutritional, therapeutic, economic, ecological, ornamental importance. Due to these aspects, we consider that the topic chosen by us is very topical. In this work, we have analyzed the stages of sea buckthorn cultivation since the project phase, for a healthy and profitable plantation.

3. RESULTS AND DISCUSSION

Organization and arrangement of the sea buckthorn plantation

In order to guarantee the success of a sea buckthorn plantation, a planned investment is necessary for an exploitation period of at least 20-25 years, aspects related to the relief, climate, soil, procurement of planting material and rainfall must be taken into account.

On the basis of these factors, the plantation is designed and the total costs are estimated through estimates by category of work, all these data finally making up the technical project for the establishment of the plantation. The development and authorization of the establishment project will guarantee a quality plantation, respecting the agro-technical norms, high productivity, a realistic business plan and an increased profitability. After drawing up the project, certain important stages are completed for a sea buckthorn plantation.

The first operation is the drawing of the main roads that must ensure easy access to all plots and be connected to the other communication routes around. The direction of the row in plantations on terraces or on sloping land will be that of the level curves. On sloping land, choose planting in a triangle, thus obtaining a mosaic plantation, because these lands are prone to erosion.

Sea buckthorn planting on flat land, which does not present problems, will be done in such a way that the plants benefit from the sun. Depending on the type of plantation, intensive or classic, sea buckthorn can be grown in flattened or globular form. The flattened shape is specific to intensive plantations. By directing the crowns in this form, a series of agrotechnical advantages is achieved, the mechanization of soil maintenance works, the fight against diseases and pests, easy cutting and harvesting works. The globular management of the bushes is done both in classic plantations and in isolated plants, this being in fact the natural form of sea buckthorn. The sea buckthorn stands out for its ability to adapt to soil and climate conditions, developing on any type of soil and climate regime, frosts and long-lasting droughts not being a problem for this shrub. Before planting, the land is cleaned of plant debris, ploughed to a depth of 25-30 cm and discussed, and in the case of terraced land there is no need for the soil to be ploughed, the land is cleaned and the pits are made for planting.

The sea buckthorn easily adapts to different living conditions, without the need to use fungicides, insecticides or fertilizers, which is why it also spreads spontaneously.

Planting period

Planting in the plain or hilly area will be done in autumn, at the end of October, so that the plants benefit from more moisture in the soil.

If this period is omitted, planting is done in early spring, when the land has drained of water and the work can be done efficiently. If the land is plowed in the fall, in the spring it is shredded and the planting pits are made as early as February or March, depending on the weather. In the submontane and mountain area, the sea buckthorn plantation is established in early spring, when there is sufficient precipitation.

Planting distances - The sea buckthorn planting distance is chosen depending on the soil, the way the plants are managed, the harvesting method, the fertility and the configuration of the land.

In the case of planting on terraces, the distance between plants is calculated according to the size of the terrace.

The distances can be the following:

- 2.8 - 3 m between rows and 2 m between plants per row, in the case of flattened crowns per row;
- 3.5 - 4 m between rows and 2 - 2.5 m between plants per row for the globular form;
- 4 m between rows and 3 m between plants per row in the case of vigorous varieties planted on fertile lands with the shape of the globular crown. Before planting, the plants are subjected to preparation techniques, shortening the longest roots to 20-25 cm and removing diseased and

broken roots. After this operation, the roots are covered with mud and placed in the pit with the roots spread out. The plant is positioned in the middle of the pit in a vertical position. Cover the roots, press for effective contact with the soil, then water abundantly with 6-8 litters of water.

Sea buckthorn plantation maintenance

The sea buckthorn plantation is kept clean of other grasses and is watered during the dry season. Repeated weeding is carried out, and in the middle of the rows of sea buckthorn, other plants of small height are grown, for example root crops or potatoes. Also, to ensure optimal development, herbicides are applied in the first two years after planting. In the areas where there are rodents, the trunks of the sea buckthorn are wrapped during the winter with strips of waxed paper, sunflower stems, etc.

Sea buckthorn fertilization - during the first two years of its life, the plant is fed with the fertilizers applied at planting, however, after this period, phosphorus and potassium-based fertilization is carried out in the case of poor soils and nitrogen fertilizers.

The plantation can be fertilized naturally with 100-150 kg/ha of ammonium nitrate, administered in the spring at the start of vegetation and 200 kg/ha of potassium salt in the fall, after harvesting the fruits.

If these fertilizers are not applied at the right time, a quantity of 400 kg/ha of superphosphate and 200 kg/ha of potassium salt can be applied once every 3-4 years, together with 20-50 t/ha of manure.

Irrigation of the sea buckthorn - is very important in the first two years after planting, it prevents the plants from drying out, stimulates growth and forms the crown, being the support of production from the first years of fruiting. For a rich harvest, there must be a humidity of 70-60% in the soil, on medium and heavy, clay-clay and clay soils, and of 60-70% on sandy and clay-sandy soils. A watering rate of 300-400 m^3/ha is recommended.

Cuttings and crown shapes for sea buckthorn - cuttings form the crown and facilitate picking, stimulate the growth of fruit branches. The earlier the cuttings are done on young trees, the more the growth is tempered and limited in the case of vigorous varieties, favouring fruiting.

Sea buckthorn can be led in different forms, globular crown, cord or flattened in a row.

To obtain the globular shape, in the first 2-3 years after planting, choose a stem that represents the main axis, on which the side branches are formed.

Immediately after planting, the main stem is chosen, a third of the length is shortened, for vigorous plants, or half of the length for smaller plants. In the 2nd and 3rd year after planting, the formation of skeletal branches at a distance of 30 cm and thick branches at a distance of 12-15 cm, arranged in an alternating position, is followed.

The cuts are made, after harvesting, by two methods. The first method involves thinning the branches with fruit at distances of 10-12 cm, inside the crown and suppressing the branches at a distance of 6-7 cm from those on the periphery of the crown. Part of the branches is removed from the tree, from the point of insertion, and the other part is cut leaving a head of approximately 2 cm, from which fruiting shoots will form the following year. The second pruning method consists in suppressing the branches on half of the crown in one year and the other half in the following year. This ensures fruiting once every 2 years.

The flattened crown in rows is formed right from planting when the central axis and the main branches are chosen. The central stem is shortened to approximately 40 cm high. In the 2nd and 3rd year after planting, other branches are chosen at distances of 25 cm between them, and extension shoots that are shortened to a third. These branches are thinned to a distance of 12-15 cm, between them and shortened to a length of 30-35 cm. The rowan begins to bear fruit starting with the 2nd year.

Sea buckthorn propagation methods

Sea buckthorn is a plant that can be propagated by several methods: seeds, green or dry cuttings or in vitro by micropropagation.

Propagation by seeds - it is recommended to be done only for ameliorative, ornamental or ecological purposes. The ameliorating part can be combined with the commercial part, by establishing large experimental fields with seedlings obtained from seeds. The seeds must come from overripe fruits for high viability. The seeds are washed, dried and stored in a cloth bag until the sowing date. 80-90g of seed are obtained from one kg of fruit. Before sowing, the seeds are stratified for 30 days in soil or wet sand at temperatures of 3-5oC. In practice, soaking the seeds in napa for 30 0re is also used. After the needles are removed from the water, the seeds are disinfected in a potassium hyper manganate solution. Disinfection with potassium permanganate is effective against fungi and bacteria. When we are not sure about the biological material, we have available, thermal disinfection can be practiced. This also works against viruses, but it is more expensive. During vegetation, it is carried out normal care work.

Propagation by cuttings - can be done by two methods, green or dry. This method is recommended for the establishment of commercial plantations, in the case of units producing specialized planting material.

Green cutting advantages:

- high number of cuttings that can be harvested;
- high rooting rate;
- high efficiency;
- keep the features of the mother plant unaltered.

Green pruning disadvantages:

- high cost, requires protected spaces and efficient irrigation systems;
- high labor costs;
- one year delay in planting in the field;
- the establishment of plantations specially intended for taking cuttings;
- medium spaces occupied by the material until the moment of transfer to the field.

Sea buckthorn propagation by dry cutting is used due to the low cost of the works, carrying out the works in the absence of artificial fog installations.
Dry cutting advantages:
- fast entry into the fruit;
- simple work method;
- high average rooting rate;
- reduced labour and equipment costs;
- keep the features of the mother plant unaltered.
Dry cutting disadvantages:
- requires a large number of plants and special plantations for taking cuttings;
- requires large cuttings for successful rooting;
- takes up a lot of space until planting;
- easily transmit different diseases.
Multiplication in vitro by micropropagation - involves the vegetative multiplication by rapid cloning of some forms of sea buckthorn of agronomic interest, as well as diaresis and maintaining them in optimal phytosanitary condition.
The method is recommended for the establishment of mother plantations intended for the harvesting of cuttings or for the direct obtaining of planting material, in the case of the establishment of commercial plantations.
In sea buckthorn, this method of propagation is the prerogative of research laboratories, in the sense of producing new varieties. In Romania, the institutes from Maracineni, Stefanesti and Fundulea are prestigious institutions that have been noted over time by patenting various varieties of plants from different species.

Multiplication by dragons
Rooting is the ability of plants to produce shoots. The sea buckthorn having a high rooting capacity, allows the roots to be harvested directly and used for planting. It is recommended to fertilize the land intended for planting dragon fruit.
Multiplication by marcots
This method is similar to cutting, with the difference that the shoot is not detached from the mother plant. The buckthorn lends itself to mulching, the mulch is removed after 2 years when the mar cots have developed vigorous roots. From one plant you can get 10-12 mar cots.
Harvesting sea buckthorn fruits is a laborious process, because the fruits are very small, have short and rigid tails, arranged around the branches, which are the main reasons that make harvesting difficult. The optimal time of harvesting is chosen according to the method of utilization of the fruits.
The fruits can be picked when they reach maturity. From a calendar point of view, picking begins after August 15 until October 15. After this date, the fruits decrease in weight, crush and crack at the time of harvesting. Therefore, the most optimal time to pick sea buckthorn fruits is the end of September and the beginning of October.
Therefore, the time of harvesting is very important in obtaining fruits with special properties. Sea buckthorn fruits can be harvested manually or mechanized.
Manual harvesting involves removing the fruit by hand, individually, grain by grain directly from the bush. Manual fruit picking has the advantage that the plant is not damaged, but the yield is low. A picker can harvest 5-10 kg per day. The system of using tools such as: rakes, combs with long metal teeth, etc. is also practiced. By using these tools, the yield increases to 15-16 kg per day. Mechanized harvesting is done by individual shaking, with the help of pneumatic vibrators electrically operated by the power of a tractor. The fruits fall on a collecting tarp, placed under the tree and are cleaned of impurities with a ventilation system.
In a fresh state, the fruits can be kept for about a month in cold stores. If they are harvested by manual technique, grain by grain, they can be kept for a long time until processing. The transport of very ripe fruits over long distances with means of transport without refrigeration systems is avoided.



Figure 2. Sea buckthorn harvest

From an economic point of view, sea buckthorn fruits are used in 100% percentage. The most advantageous products obtained from sea buckthorn are sea buckthorn seed oil, pulp oil, flavon powder, flavon capsules, extracted vitamins, bioactive components, dried fruits, food additives, natural extracts, natural food colors, natural acids and vitamin C. they can also be used in the form of syrup, nectar, jam, marmalade, etc.

4. CONCLUSIONS

The geographical position, the physical-geographical, lithological complexity and the radial distribution of the altitudinal gradients of the landforms create a great diversity of microclimatic and pedological conditions. This variability of the composition and structure of the substrate and abiotic conditions determines the richness, distribution and level of representation of the types of ecosystems and natural habitats on the territory of Romania.
Due to its qualities, sea buckthorn is used in culture to fix land and combat soil erosion, to harvest fruits, bark, branches and leaves for medicinal, food and pharmaceutical purposes.

Considering the special valences in maintaining health and treating some ailments, we must take care of this natural wealth of Romania - buckhorn, and we must not consider it inexhaustible, in order not to disappear especially from the spontaneous flora before our eyes.

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