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Peculiarities of the root-suckering ability of *Hippophae rhamnoides* L. *plants* (East Kazakhstan region)

The article presents data on the root-suckering ability of *Hippophae rhamnoides* L. under various ecological and geographical conditions: in natural populations, at a breeding site, and in the introduction population of the Altai Botanical Garden. Based on age structure, the natural populations of the species are classified as fast-growing and stable. The lifespan of plants ranges from 16 years in the Karatal population to 32 years in the Tersayryk population. In culture, some forms and seedlings are 38 years old. By the number of root shoots *H. rhamnoides* L. in natural habitats and in the introduced population (clumps) the proportion of plants of the first and second age groups is high. In natural populations there are from 540 pcs/ha to 5173 pcs/ha of plants of the first age group, in the clumps of the introduced population from 1353 pcs/ha to 2076 pcs/ha, which in percentage terms is 30–79 %, 50–69 %, respectively. In the second age group in natural habitats there are plants from 380 pcs/ha to 556 pcs/ha, in clumps — from 457 pcs/ha to 844 pcs/ha. Undoubtedly, the influence of genes and environmental factors on the high root-suckering ability of plants is affected. The most optimal number of root suckers from 16 to 30 pcs per 12 m^2 in a breeding garden allows obtaining high-quality planting material. *Hippophae rhamnoides* L. of the East Kazakhstan ecotype is characterized by high root-suckering ability, winter hardiness, and longevity, which makes it suitable for use as a reclamation plant.

Keywords: Hippophae rhamnoides L., species, root shoots, clump, population, selection plot, seedling, phytocenosis.

Introduction

Hippophae rhamnoides L. (Sea buckthorn) is a Eurasian species that belongs to the family Elaeagnaceae Juss., has attracted attention since ancient times as a medicinal, food, vitamin, ornamental and soil-fortifying plant. I.P. Eliseev [1, 2] subdivides *H. rhamnoides*, growing in the territory of the CIS, into several climatypes: Siberian, Central Asian, Caucasian and Baltic. The Siberian climatype unites all populations of Transbaikalia, the vast Sayan-Altai Mountain region and the East Kazakhstan region. This climatype is characterized by a shorter vegetation period and outstanding frost resistance.

H. rhamnoides, a large shrub 0.7–high 3,5 м, less often a tree up to high 10 m with a well-developed superficial root system. The roots are bare, thick, long, have a loose anatomical structure, the mechanical tissue in them is poorly developed, they are relatively easy to break, have the ability to give abundant root shoots. They have numerous nodules with nitrogen-fixing bacteria. The ability of sea buckthorn to produce root shoots is one of its adaptive capabilities.

The impact of man, which is taking on an ever-widening scale on nature, with irrational and short-sighted management of its gifts can lead to innumerable troubles and global catastrophes. Open-pit mining of minerals disrupts tens of thousands of hectares of valuable lands, which must be subject to mandatory restoration [3, 4, 5, 6, 7]. Reclamation and rehabilitation of natural landscapes disturbed by man are important socio-economic and scientific-technical problems. Research on forest reclamation is broad in scope, comprehensive and practical in nature.

Sea buckthorn plays a significant ecological role, performing soil-protective and water-protective functions. The high root-suckering capacity of sea buckthorn is used to fix sand, dunes, ravines, gullies, railway slopes, landslide slopes and scree in mountainous areas, coastal mountain rivers, protect roads from snowdrifts, etc. It is often used as an ameliorant in near and far abroad countries: Russia, Kyrgyzstan, Georgia, the Czech Republic, Slovakia, China [8, 9, 10, 11]. In Kazakhstan, this species is considered a promising crop for the reclamation of industrial waste dumps of the Sokolovsky iron ore quarry [12] and at mining enterprises in Northern Kazakhstan [13]. Its use in forest formation process is promising in many regions of Kazakhstan, as it has the potential to grow in extreme conditions, including on the Mangyshlak Peninsula, according to the Mangyshlak Experimental Botanical Garden of Aktau, it grows well in an extra-arid climate, on gray-brown soils that are saline everywhere. The relevance of this study lies in assessing the root-suckering ability

of natural populations of *H. rhamnoides* in the East Kazakhstan region for further use in land reclamation and restoration.

The main objective of the study is to study natural populations of *H. rhamnoides* in the East Kazakhstan region and under introduction conditions with identification of the characteristics of root-suckering ability.

Materials and methods

Work on the study of the root-suckering ability of H. rhamnoides were carried out in natural populations of the East Kazakhstan region and in the conditions of the Altai Botanical Garden (ABG) during the introduction of clonal and seed material. Work in the Kenderlyk, Shetlasty, Tersayryk, Topkain, Kaindysu and Karatal populations was carried out using the route method. The names of the populations are given in accordance with the geographical names of their places of growth by the name of the rivers. Considering the clump-shaped arrangement of sea buckthorn in natural populations, test plots were laid out in all populations according to a single principle.

The study of the age composition of sea buckthorn and its abundance was carried out on sites, the number and area of which were laid out depending on the share of the species in various phytocenoses. The size of the trial plots was from 0.16 to 0.55 ha (120×40 m), (70×70 m), (65×85 m), (50×100 m) (40×40 m), (30×60 m), (25×40 m), depending on the number of individuals, usually this number reached from 92 to 373 specimens, the configuration was mosaic.

The unit of measurement of age class in natural sea buckthorn populations, taking into account the beginning of fruiting and life expectancy, was adopted as five years. All plants were distributed into five age groups according to the methods developed by the M.A. Lisavenko Siberian Research Institute of Horticulture [14].

When determining the maximum lifespan of plants in nature, plants with the greatest height and trunk diameter were cut down, the cuts were processed with sandpaper, and then the annual rings were counted. In introduction experiments, the lifespan of forms brought from nature by root shoots and seedlings obtained from free pollination was recorded based on the fact of plant death. In culture, in clumps, the age composition was studied using the above-mentioned method.

When laying out a breeding plot in 2008 in the Altai Botanical Garden in Ridder, the following planting scheme was used for seedlings from free pollination of local reproduction at the age of three and four years: 4 m between rows and 2 m in a row, with a placement of 1250 pcs/ha. The plot is located on the southeastern slope of Belkina. The soil where sea buckthorn grows is well tied to the relief and is represented by chernozem-like dusty loams (humus content of 6.45 %), quite rich in nitrogen (127 kg/ha), but has some deficiency in phosphorus. The validity and reliability of the data is ensured by a significant volume of research conducted in natural populations, in culture and on the breeding plot.

Results and discussion

Natural thickets of *H. rhamnoides* in the Republic of Kazakhstan in the 80s of the last century occupied 2640 hectares, with their discontinuous (disjunctive) range they enter the East Kazakhstan region and occupy 680 hectares [15]. Within the range, the species was studied in six populations in the river valleys: Tersayryk, Shetlasty, Kenderlyk, Kaindysu, Topkain and in inter-dune depressions in the Karatal sands (Fig.) [16, 17]. Edaphic factors in the valleys of mountain rivers in almost all geographical zones of sea buckthorn growth are similar — these are sandy and pebble shoals of rivers with the inclusion of alluvial silt deposits. In geographically isolated populations of mountain river valleys, the moisture conditions are also similar.

Figure. Natural populations of *Hippophae rhamnoides* L.

In the morphogenetic process of this species, geographical isolation is of primary importance. Eliseev emphasizes that the floodplain as an ecological niche is secondary for sea buckthorn, since the valleys of mountain rivers have a relatively young geological age, and their floristic composition is always formed due to the surrounding zonal vegetation [2].

Phytocenoses of populations consist, depending on the altitude above sea level — from 650 m (Karatal) to 1200 m (Tersayryk) of sea buckthorn, woody deciduous, shrubby and herbaceous plants of the local floodplain flora. The tree layer of the studied populations is poorly developed. Single species include: *Populus laurifolia* Ledeb., *P. pilosa* Rehd., *P. alba* L., *Betula tianschanica* Rupr., *Salix tenuijulis* Ledeb., *S. viminalis* L., *S. caspica* Pall., *Crataegus altaica* Lange. In the second tier it is accompanied by: *Lonicera tatarica* L., *Viburnum opulus* L. In the shrub layer in great abundance — *Berberis heteropoda* L. Less common is *Myricaria dahurica* (Willd.) Ehrenb., *Rosa laxa* Retz. The grass cover is represented by species of steppe and semi-desert vegetation: *Artemisia sericea* Weber ex Stechm., *Calamagrostis epigeios* Steud., *Phragmites australis* (Cav.) Trin. ex Steud., *Sophora alopecuroides* L., *Paeonia anomala* L., *Glycyrrhiza aspera* Pall. These plants can serve as a basis for the creation of artificial phytocenoses in the steppe and semi-desert zones of the Republic of Kazakhstan. With the melioration and reclamation of lands, it is possible to organize phytocenoses of sea buckthorn similarly to natural phytocenoses.

When studying the number and age composition of the populations, five groups were identified: young, mid-season, maturing, ripe and overmature. In 7 the trial plots, a large number of young plants under 5 years of age are noted, in percentage terms, they make up an average of 62 %. The largest number of root shoots, young plants 5173 pcs/ha are in the Shetlastinskaya population, which is 79.8 % (Table 1).

Table 1

The number of plants of *H. rhamnoides* by age categories in natural populations

Population	Age category	Number of plants per 1 piece/ha	% of total
Kendyrlyk	young animals (1–5 years)	1740	65.0
	middle-aged (6–10) years)	482	18.0
	maturing (10–15 years)	148	5.5
	ripe (16–20 years)	106	4.1
	overmature (21–25 years)	197	7.4
total		2673	100
Kaindysu	young animals (1–5 years)	540	30.7
	middle-aged (6–10 years)	415	23.6
	maturing (10–15 years)	605	34.4
	ripe (16–20 years)	135	7.7
	overmature (21–25 years)	65	3.6
total		1760	100

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Continuation of Table 1

Population	Age category	Number of plants per 1 piece/ha	% of total
Tersayryk	young animals (1–5 years)	2360	72.6
	middle-aged (6–10 years)	380	11.7
	maturing (10–15 years)	368	11.3
	ripe (16–20 years)	86	2.6
	overmature (21–25 years)	53	1.8
total		3247	100
Shetlasty	young animals (1–5 years)	5173	79.8
	middle-aged (6–10 years)	556	8.6
	maturing (10–15 years)	483	7.5
	ripe (16–20 years)	123	1.9
	overmature (21–25 years)	143	2,2
total		6478	100
Karatal	young animals (1–5 years)	367	22.0
	middle-aged (6–10 years)	272	16.3
	maturing (10–15 years)	162	9.7
	ripe (16–20 years)	869	52.0
total		1670	100
Topkain	young animals (1–5 years)	216	16.7
	middle-aged (6–10 years)	197	15.3
	maturing (10–15 years)	284	22.0
	ripe (16–20 years)	319	24.8
	overmature (21–25 years)	274	21.2
total		1290	100

There are two times less of them in the Tersayryk population 2360 pcs/ha (72.6 %), three times less in the Kenderlyk population — 1740 pcs/ha (65.0 %) and 9.5 times less in the Kaindysu population — 540 pcs/ha (30.7 %). In the latter population, the number of root shoots is affected by anthropogenic impact and proximity to the settlement of Akzhar village. The local population collects firewood and grazes cattle. The data in Table 1 indicate high percentages of plants in the first group (young plants) in relation to the total number. This group occupies a leading position in each of the populations, from 30.7 % in the Kaindysu population to 79.8 % in the Shetlasty population. The reasons for such differences are various ecological and geographical conditions, as well as numerous influences of biotic and abiotic environment of populations, which to varying degrees affect the factors determining their age structure. Thus, our studies confirm that sea buckthorn plants of natural populations have a high root sucker capacity. Reproduction of sea buckthorn in natural populations mainly occurs due to the formation of root suckers, which are associated with the mother plant throughout their life and form clumps. For example, in the Kenderlyk population there are areas where there are 9–18 root suckers per 1 m^2, which theoretically reaches a number of 90 thousand pcs/ha. The clumps are usually unisexual, sometimes mixed with a predominance of one or another sex. The habitat of sea buckthorn plays a certain role in the ability to produce root suckers. As studies have shown, in those populations where a greater number of plants of the first group are noted, young plants aged from 1 to 5 years are observed, basic, similar complexes of physical-geographical and biocenotic conditions. These are the Shetlasty, Kenderlyk, and Tersayryk populations. They have the principle of ecological compliance according to abiotic conditions: flat surface, hydrographic factor, river valleys: Shetlasty, Kenderlyk, Tersayryk and soil rubble-clayey with the same fertility necessary for the growth and development of plants, as well as the formation of root shoots. The hydrogeological regime of rivers during flooding in early spring contributes to an increase in soil fertility, the content of water and mineral nutrients in the soil. In the Karatal population, only 20 % of the total number of plants are young plants (root shoots), this is explained by the special habitat of sandy dry soils. The lifespan of plants depends on the habitat and varies from 16 years in

the Karatal population to 32 years in the Tersayryk population. In the Shetlasty and Kenderlyk populations, lifespan reaches 22–26 years.

There is little seed-based undergrowth, since seeds germinate poorly in sodded areas. Adult plants grown from seeds are confined mainly to the river bed. About the good root-suckering ability of sea buckthorn This is indicated by the fact that more than half of the forms isolated according to economically valuable characteristics had root suckers.

In the 80s and 90s of the last century, 68 best forms of sea buckthorn from five populations were brought to the Altai Botanical Garden, which were cloned by separating root shoots of 4–8 pieces from each mother plant. This method allowed it to be introduced into culture faster, since their survival rate was high 60–70 %, despite the fact that some forms had to be transported from one place to another for 1-2 days, up to 25 days in total. The plants, which were in bags, were constantly moistened by immersing them in water. During the introduction, all of them showed good and extreme adaptive plasticity. The same plants that did not have root shoots were brought from the same populations by seeds, from 52 mother individuals, most of them were preserved and served as the source material for selection, seedlings of three generations were obtained from them.

Evidence of the high adaptability of *H. rhamnoides* in the Altai Botanical Garden is also the formation of three clumps with a total area of 10,575 m^2 from 335 to 580 m^2 due to root shoots from male and female individuals, actively occupying living space.

Currently, intensive vegetative propagation is observed both inside the clumps and along the edges. Their density and size have been maintained at almost the same level for 35 years, since 1983. Their rejuvenation is observed due to an increase in the proportion of individuals of the first and second age groups. Abundantly fruiting plants aged 15–28 years grow in these clumps. Each clump contains plants represented by five age groups. The nature of the preservation of age spectra over a long period of time indicates the ability of the species to exist in culture. The number of plants per hectare is approximately within the same range as in nature, from 3,009 pcs in clump № 1 to 3,890 pcs in clump № 2 (Table 2).

Table 2

***H. rhamnoides* plants by age categories in the clumps of the Altai Botanical Garden**

Clump of trees	Age category	Number of plants per piece/ha	% of total
Clump № 1	young animals (1–5 years)	2076	69.0
	middle-aged (6–10 years)	457	15.2
	maturing (10–15 years)	241	8.0
	ripe (16–20 years)	120	4.0
	overmature (21–25 years)	115	3.7
total		3009	100
Clump № 2	young animals (1–5 years)	1353	50.2
	middle-aged (6–10 years)	844	21.7
	maturing (10–15 years)	443	11.4
	ripe (16–20 years)	265	6.8
	overmature (21–25 years)	385	9.9
total		3890	100
Clump № 3	young animals (1–5 years)	1993	57.2
	middle-aged (6–10 years)	651	18.6
	maturing (10–15 years)	374	10.8
	ripe (16–20 years)	190	5.5
	overmature (21–25 years)	276	7.9
total		3483	100

The largest number of root suckers, young plants 2076 pcs/ha in clump № 1, which is 69.0 %. Less than 57.2 % in clump № 3 and 50.2 % in clump № 2. In clump № 1, there is currently a keen sense of competition in conquering the area, since the number of root suckers included in the first group is 69 %. A study of the

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age composition in clumps growing in the garden allows us to conclude that due to the high percentage of plants in the first and second age groups, they belong to the category of fast-growing.

An important property of sea buckthorn in the East Kazakhstan region is winter hardiness. Thus, plants growing in the Altai Botanical Garden in a sharply continental climate with cold, long winters, often reaching a critical mark of 40–42ºC and repeated thaws with temperature drops of 18–20ºC, withstand critical temperatures without damage.

Testing of sea buckthorn plants from the Kenderlyk forestry enterprise (East Kazakhstan region) in the Novgorod region (Russia) by V.A. Fefelov [18] allowed us to conclude that it has outstanding frost resistance, which is genetically determined.

In the first two years after planting 96 seedlings on the selection plot in 2018, a large number of root suckers were formed: from 2 to 147 pcs per each plant. Apparently, the age of the seedlings had a positive effect on the root sucker capacity. This is approximately 10,500 pcs/ha ready for planting, the same number per hectare was noted during reclamation in the Volgograd region (Russia) [19]. They were divided into four groups: with a small number from 2 to 36 pcs per seedling, which is 57.6 %; with an average from 37 to 73 pcs — 21.7 %; large from 74 to 110 pcs — 15.2 % and very large from 111 to 147 pcs — 5.5 % (Table 3).

Table 3

Distribution of root suckers *H. rhamnoides* by groups of some indicators (by quantity and in %) on the selection site

Feature	Distribution of features by groups	Quantity, pcs	% ratio
Number of root shoots	few (2–36 pcs)	53	57.6
	average (37–73 pcs)	20	21.7
	many (74–110 pcs)	14	15.2
	very many (111–147 pcs)	5	5.5
Number of root shoots ready for planting	few (1–15 pcs)	58	62.4
	average (16–30 pcs)	23	24.7
	many (31–47 pcs)	12	12.9
Root shoots ready for planting to the total number	average (21.9–45.0)	55	67.9
	high (45.1–75.0)	26	32.1
Root suckering ability of female plants	few (2–36 pcs)	14	38.8
	average (37–73 pcs)	8	22.2
	many (74–110 pcs)	6	16.6
	very many (111–147 pcs)	8	22.2
Root suckering ability of male plants	few (2–36 pcs)	8	32.0
	medium (37–73 pcs)	4	16.0
	many (74–110 pcs)	10	40.0
	very many (111–147 pcs)	3	12.0
Height of root shoots	tall (174–260 cm)	37	38.9
	medium (83–73 cm)	58	61.1
Max. height of root shoots	low (10–50 cm)	36	37.5
	medium (51–91 cm)	49	51.0
	tall (92–120 cm)	11	11.5

When calculating the number of root suckers ready for planting, the obtained data are divided into three groups: few root suckers from 1 to 15 pcs. have 62.4 % of plants; average number from 16 to 30 pcs have 24.7 % of plants; many from 31 to 47 pcs — 12.9 %. The most optimal number of root suckers 24.7 % is in the second group. The fewer root suckers from the maternal and paternal individuals, the more plants are ready for planting with an optimal height of 51 to 91 cm. The accounting of root shoots during the establishment of the garden in the Altai Botanical Garden with seedlings, the origin of which is from different populations, showed that this ability is preserved from ecotypic differences. More root shoots were given by

seedlings from the Shetlasty and Kenderlyk populations, less from the Karatal. The introduction experiment on sea buckthorn in the Altai Botanical Garden showed that the varieties brought from the Research Institute of Plant Breeding named after M.A. Lisavenko practically do not produce root shoots, do not have such ability. This allows us to draw a conclusion about the influence of genetically diverse forms on such a biological property as plant reproduction. In the first years, sea buckthorn is characterized by higher growth energy. If we take into account the formation of root suckers by female and male plants, a higher percentage of output from 74 to 110 pcs is observed in male plants in the third group 40.0 % compared to 16.6 % in females. In the remaining groups: few, average and very many — the data in percentage terms are comparable. The percentage with a small number of shoots is almost the same, 38.8 % was obtained from female and 32.0 % from male, with an average number of 22.2 % for female and 16.0 % for male. In the group — very many root shoots, a predominance of 22.2 % was noted in female plants.

Conclusion

In this work, the root-suckering ability of sea buckthorn and the nature of its natural distribution in various ecological and geographical conditions and in culture in the East Kazakhstan region are determined. The root-suckering ability of sea buckthorn is one of its adaptive capabilities. The lifespan of plants in nature and in culture is also important, for which it reaches 22–35 years. Data from the experience of introducing varieties of sea buckthorn bred by the M.A. Lisavenko Research Institute of Horticulture of Siberia in the Altai Botanical Garden showed that their varieties are short-lived (16–20) years, and almost do not form root suckers at any age. *H. rhamnoides*, growing in the East Kazakhstan region, has a high root-suckering capacity, which allows us to recommend it for the restoration of lands, slopes, ravines, etc.

Sea buckthorn plants from natural populations have a high root-suckering capacity, which is confirmed by our studies in natural populations, in culture and on a selection site in the conditions of Eastern Kazakhstan. The degree of influence of genes and environmental factors on the high root-suckering capacity of plants is unambiguous. In terms of the number of plants per 1 ha in nature, the data range from 2673 pcs/ha in the Kenderlyk population to 6478 pcs/ha in the Shetlastinskaya population and 10500 pcs/ha in the breeding plot in the Altai Botanical Garden. In order to increase the economic efficiency of reclamation processes, it is advisable to use sea buckthorn plants from Eastern Kazakhstan for their high root-suckering ability, longevity and winter hardiness.

We recommend using 3-4 year old plants for planting, deepening them 8 cm from the root collar, and using forms and seedlings taken from the Kenderlyk, Shetlasty, and Tersayryk populations in steppe regions, and the Karatal populations on sandy soils.

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Author Contributions

The manuscript was written with the participation of all authors. All authors approved the final version of the manuscript. **Vdovina T.A.** – Research in natural populations, Methodology; **Lagus O.A.** – Research in the breeding garden, Editing; **Isakova E.A.** – Data curation, Research in the breeding garden.

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Hippophae rhamnoides L. өсімдігінің тамыр атпаларын түзу қабілетінің ерекшеліктері (Шығыс Қазақстан облысы)

Мақалада *Hippophae rhamnoides* L. өсімдігінің әр түрлі экологиялық-географиялық жағдайларда: табиғи популяцияларда, селекциялық учаскеде және Алтай ботаникалық бағының интродукциялық популяциясында тамыр атпаларын түзу қабілеті жөніндегі деректер келтірілген. Жас құрылымына қарай табиғи популяциялар жылдам өсетін және тұрақты топқа жатқызылды. Өсімдіктердің тіршілік ұзақтығы қаратал популяциясында 16 жылды, терісайрық популяциясында 32 жылды құрайды. Дақылдық жағдайда кейбір түрлер мен көшеттер 38 жылға дейін өмір сүреді. Табиғи мекендерінде және интродукциялық популяциядағы *Hippophae rhamnoides* L. өсімдіктерінде тамыр атпаларының саны бойынша бірінші және екінші жас топтарының үлесі жоғары. Табиғи популяцияларда бірінші жас тобына жататын өсімдіктер саны 540 данадан 5173 дана/га-ға дейін, ал интродукциялық популяциядағы шоғырда 1353 данадан 2076 дана/га-ға дейін жетеді, бұл 30-79 % және 50-69 % аралығында. Екінші жас тобындағы өсімдіктер саны табиғи мекендерде 380-556 дана/га, ал интродукциялық популяцияда 457-844 дана/га аралығында өзгереді. Өсімдіктің жоғары тамыр атпаларын түзу қабілетіне генетикалық факторлар мен сыртқы орта жағдайларының әсері айқын байқалады. Селекциялық бақта 12 м²-ге шаққанда 16-30 тамыр атпасының болуы сапалы егу материалын алуға мүмкіндік береді. Шығыс Қазақстан экотипіндегі *Hippophae rhamnoides* L. өсімдігі жоғары тамыр атпаларын түзу қабілетіне ие болғандықтан, оны мелиорациялық өсімдік ретінде қолдану ұсынылады. Бұл түр жоғары қысқа төзімділігімен және ұзақ өмір сүруімен ерекшеленеді.

Кілт сөздер: *Hippophae rhamnoides* L., түр, тамыр атпалары, өсімдік шоғыры, популяция, селекциялық учаске, көшет, фитоценоз.

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Особенности корнеотпрысковой способности растений *Hippophae rhamnoides* L. (Восточно-казахстанская область)

В статье представлены данные по корнеотпрысковой способности *Hippophae rhamnoides* L. в различных эколого-географических условиях: в природных популяциях, на селекционном участке и в интродукционной популяции Алтайского ботанического сада. По возрастной структуре природные популяции вида отнесены к категории быстрорастущих и устойчивых. Продолжительность жизни растений варьирует от 16 лет в каратальской популяции до 32 лет в терсайрыкской. В культуре у некоторых форм и сеянцев возраст равен 38 годам. По количеству корнеотпрысков Hippophae rhamnoides L. в естественных местообитаниях и в интродукционной популяции (куртинах) высока доля растений первой и второй возрастных групп. В природных популяциях насчитывается от 540 шт/га до 5173 шт/га растений первой возрастной группы, а в куртинах интродукционной популяции от 1353 шт/га до 2076 шт/га, что в процентном выражении составляет 30–79 % и 50–69 %, соответственно. Во второй возрастной группе в естественных местообитаниях произрастает растений от 380 шт/га до 556 шт/га, в куртинах от 457 шт/га до 844 шт/га. Несомненно сказывается влияние генов и факторов внешней среды на высокую корнеотпрысковую способность растений. Самое оптимальное количество корнеотпрысков от 16 до 30 шт. на 12 м^2 в селекционном саду позволяет получать качественный посадочный материал. *Hippophae rhamnoides* L. восточно-казахстанского экотипа характеризуется высокой корнеотпрысковой способностью, зимостойкостью и долголетием, что позволяет рекомендовать его в качестве мелиоративного растения.

Ключевые слова: Hippophae rhamnoides L., вид, корнеотпрыски, куртина, популяция, селекционный участок, сеянец, фитоценоз.

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