

Indicators Of Natural Recovery Of Hawthorn In Southern Uzbekistan

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Abstract – The article presents the research results on the natural hawthorn habitats identification, species biodiversity in the genus and natural hawthorn recovery indicators. According to the study, hawthorns in the Republic territory are mainly distributed in the southern regions, in these areas there are Pontic species (*Crataegus pontica* C.Koch) and red hawthorn (*Crataegus turkestanica* Pojark.). The research was conducted in the Pontic hawthorn (*Crataegus pontica* C.Koch), its selected form was 11.8-18.7% in fruit diameter, 13.3% in fruit length, 33.3-45.4% in fruit weight, 14.3-33.3% in seeds weight from the control variant and other forms, and 2.0-4.6% on the core output indicator. The homogeneity coefficient determined on the basis of many young trees in hawthorns is 0.38 – 1.31, for natural recovery, this figure is required to be higher than 1.0. This means that it is necessary to carry out security work on the farms.

Keywords – Natural Recovery, Yellow Hawthorn (*Crataegus Pontica* C.Koch), Red Hawthorn (*Crataegus Turkestanica* Pojark.), Homogeneity Coefficient, Experimental Area.

I. INTRODUCTION

Hawthorn is famous for its delicious fruit. Most of its types grown for its fruit in China, Italy, Algeria, Spain, Mexico and Guatemala. Hawthorn fruits are consumed by the local population and also sold in the markets. It is of great importance in arid regions due to its size, fruit taste and resistance to external environmental factors. Despite being a valuable wood-bearing tree, it is also highly valued in beekeeping [1].

Uzbekistan forests are rich in colorful, priceless trees, nutritious and medicinal products. Fruits such as walnut, pistachio, sweet almonds, apple, cherry, hawthorn, barberry, dog-rose are among them. Our forests flora is also very rich, there are 68 trees species, 320 bush species, 134 semi-bush species, more than 2953 cocaine species. The human beings role in preserving the forests biological diversity is enormous [2].

Currently, the population is growing, there is a need to provide them with food. For this, it is necessary to make efficient use of available land. In the pre-independence period, as an irregular use result of existing land areas, there were many problems in mountainous areas, such as a sharp decline in forest area, land reclamation deterioration [3].

According to A.K. Kayimov, E.T. Berdiev [6], hawthorn species play an important role in combating erosion in the mountains. Because its root system is on the surface, it spreads to the side and prevents the soil from washing away.

E.T.Berdiev, M.Kh. Khakimova, G.B. Makhmudova [2] data show that hawthorn species have valuable medicinal properties. Hawthorn fruit is widely used in cardiovascular diseases. When propagating hawthorn from seed, it is necessary to take into account that it has a dormancy period, it is harvested early and stratified in moist sand for 5–6 months. An extract is made from the fruit. Boiling water from the leaves and flowers has a calming effect on the central nervous system. The extract is used to improve heart function and lower blood pressure. The flowers are umbrella dark red. The fruit is a five-sided apple, fiery, 1.7 cm wide. The root system is located in a soil layer of 50-60 cm and spreads to a distance of 5-10 meters from the trunk. The root system is 15 times wider than the branches projection. This biological property of yellow hawthorn ensures its easy transition to drought. It grows separately on dry mountain slopes, sometimes forming small hawthorns. In the first years it grows slowly, mainly from seed.

II. OBJECT AND METHOD OF EXPERIMENT (RESEARCH)

The experiments were carried out at the Kitob state forestry in the south of Uzbekistan. The description, biological, ecological properties and natural hawthorn distribution area were studied by analyzing literary sources. Data on the height, diameter, vegetative and generative organs structure of this tree were given. At the same time, its relationship to external environmental factors was studied and the ecological properties of the tree were described.

In order to study the Pontic hawthorn biodiversity in Kitob state forestry area, 4 forms were selected from natural hawthorns in Siyob, Mingchinor, Matmon forestry farm departments, which were compared on the following fruit indicators (per 100 fruits):

1. Fruit diameter;
2. Fruit length;
3. Fruit weight;
4. Seed weight;
5. Core output indicator.

The natural recovery degree of hawthorns was studied on the basis of V.G. Nesterov's method, and experimental 1x1 and 2x2 m² plots were allocated for analysis. The amount of 1- and 2-year-old hawthorn seedlings in them was statistically analyzed using special formulas to determine the natural recovery degree of hawthorns in the area.

III. EXPERIMENTAL (RESEARCH) RESULTS AND THEIR DISCUSSION

Hawthorn is of great importance in the national economy, it can be used for various purposes. It is planted in clusters or in rows in the landscaping of residential areas. *C.Submallis*, *C.Noelensis*, *C.Pedisellata* species are often planted in the parks. They are especially striking with their beautiful oval-shaped horns and large fruits. It is advisable to plant the hawthorn in the gardens, especially the pink-colored flower type *C.Monogyna* and *C.plenogart*. To create green zones around cities, it is necessary to plant hawthorn species *C.Altaiica*, *C.Hissarica*, *C.Tircomanica*, *C.Pseudoembigna*, *C.Rivularis*, *C.Pontica* and *C.Pseuozaralus*. These species are drought tolerant and can grow in a variety conditions. Some species of hawthorn are very suitable for the green hedge. They are easy to trim and shape. These include *C.srustali*, *C.Mexicana* and *C.Oxyasantha*.

There are more than 700 species in the hawthorn category. Most of them are widespread in North America. There are 50 species in the CIS. As a result of the introduction, 92 hawthorn species collection was created in the Botanical Garden. Most of them are from North America[5].

In Kitob state forestry area, mainly pontic and red hawthorn species are common. Pontic hawthorn grows naturally on the southern exposure slopes at 800 - 1700 meters altitude above sea level. In this region, the Pontic hawthorn reaches 10 meters height and 35 cm diameter. There are many thick thorns on the branches, up to 1 cm in length. The leaves are rhombic, three-lobed, dark green. The flowers are like an umbrella and dark red. The fruit is a five-sided apple, fiery, 1.7 cm wide. The root system is located in a soil layer of 50-60 cm and spreads at a distance of 5-10 m from the trunk. The root system is 15 times wider than the projection of the horns. This biological feature of the Pontic hawthorn makes it easy to tolerate drought. It grows mainly on dry mountain slopes alone, and in some places as a small hawthorn. The natural recovery rate of Pontic hawthorn is slower than red hawthorn[6].

The research was conducted in the Matmon, Siyob and Mingchinor forestry departments of the Kitob state forestry. Analyzing by sections, it was found that the hawthorns completeness in Matmon forestry department was 0,6, while in Mingchinor forestry department it was 0,8.

Depending on the growing conditions, hawthorns are found on streams and rocky slopes up to 2,500 meters above sea level. The growth rate of existing hawthorns in the region is moderate to good, with mostly moderate as well as fast-growing forms (Table 1).

The hawthorns growth and development continues in different ways in the farm area. For example, hawthorns in the economic zone are mainly found in the southern and southeastern regions of the mountain slopes in the same exposition of resin, dog-rose, bitter almond, prickly almond, in the northern and northwestern regions, less cool and moisture-loving species such as honeysuckle, wild apple, cherry plum, red and black barberry, maple and small-fruited cousinia have grown.

Hawthorns in Kitob state forestry are widespread in the mountainous areas, mainly in the Siyob, Mingchinor, Matmon forestry departments. When analyzed by forest divisions, Pontic hawthorn (*Crataegus pontica* C.Koch) was found in Matmon forestry, Turkestan or red hawthorn (*Crataegus turkestanica* Pojark.) in Mingchinor forestry, and yellow and red hawthorn in Siyob forestry [7-8].

Table 1. Location of hawthorns in the Kitob forestry area

№	Hawthorn forestry department	Completeness	Type
1	Matmon	0,6	Pontic hawthorn
2	Siyob	0,7	Yellow and red hawthorn
3	Mingchinor	0,8	Red hawthorn

As the study result, the fruit size is 1,6-1,9cm in diameter, 1,3-1,5 cm in length, the fruit weight is 2,2-3,2g, the seeds weight is 0,6-0,8 g, and the core output rate was 71,3-75,9% (Table 2).

Table 2. Change indicators in fruit size of Pontic hawthorn in southern Uzbekistan

№	Experiment options	Fruit diameter, cm	Fruit length, cm	Fruit weight, g	Seed weight, g	Core output indicator, %
1	1 (control)	1,6±0,01	1,3±0,01	2,2±0,05	0,6±0,01	73,9±0,58
2	2	1,9±0,01	1,5±0,01	3,2±0,05	0,8±0,01	75,9±0,26
3	3	1,7±0,01	1,5±0,01	2,4±0,05	0,7±0,01	71,3±0,41
4	4	1,7±0,01	1,5±0,01	2,5±0,04	0,7±0,01	72,9±0,37

The Pontic hawthorn fruit diameter in the experimental variants ranged from 1,6±0,01 to 1,9±0,01 cm, in the 2nd experimental variant, the indicator was 18,7% higher than the control variant, the fruit weight was 45,4% higher, and the core yield was 2,0% higher.

Hawthorn plant is naturally distributed in mountainous areas, and hawthorn forests serve to regulate water balance, shape the climate and atmosphere, increase soil fertility and provide the population with hawthorn products[7].

The climate and soil conditions of the Kitob state forestry are among the areas where hawthorn can grow. Because this forestry area is mainly located in mountainous areas, its climate is considered to be temperate. In the economic zone areas at 850-2500 meters altitude above sea level, hawthorns are widespread, growing and developing in streams and mountain slopes. The hawthorn trees growth rate is moderate and in good condition, ranging in height from 2,0 to 8,5 meters, depending on the trees age and growth area (Table 3).

Table 3. Hawthorns situation in the south of Uzbekistan

№	Elevation above sea level	Height, m	Growth and development place	Growth rate
1	850-1100	8-8,5	Streams	good

2	1100-1400	7-8,0	Streams and steep slopes	average
3	1500-2000	3,5-4,0	Rocky slopes	average
4	900-2500	7,8-8,0	Mountain slopes	good
5	1200-2300	2-2,5	Rocky mountain streams	good

The research was conducted on 10x10 m² sites located in different expositions. The natural recovery rate of hawthorns in the area was analyzed by enumerating hawthorn seedlings at the experimental sites. At the same time, the hawthorns completeness on the farm differed by exposure, it was found that the northern exposure was high (0,8), and the southern exposure was 0,6 due to erosion and the economic activity impact.

To analyze the natural recovery level of hawthorns on the farm, 10 (30 in total) experimental plots were set up in 3 sections and 5-year-old seedlings were counted in them. There were no cases without seedlings at all in the experimental plots.

The natural recovery rate analysis in the area based on the number of young seedlings in the experimental area revealed the following:

Table 4. Table for assessing the natural regeneration level of hawthorn in Kitob forestry by sections

Name of sections	Average indicator M		M	Statistical analysis				
				Δ	N	S	M _{ha}	KG
Pontic hawthorn - <i>Crataegus pontica</i> C.Koch.								
Mingchinor	37,9	±	1,90	5,7	10	100	3790	0,9541
Siyob	35,8	±	2,16	6,5	10	100	3580	1,3091
Matmon	40,3	±	1,45	4,3	10	100	4030	0,5211
Red hawthorn <i>Crataegus turkestanica</i> Pojark.								
Mingchinor	42,9	±	1,28	3,8	10	100	4290	0,3825
Siyob	32,9	±	1,8	6,1	10	100	3380	1,1091
Matmon	36,3	±	1,38	4,1	10	100	3630	0,5241

According to the forestry departments, the number of young seedlings up to 5 years per hectare was 3760-4030 pieces in Pontic hawthorn and 3380-42290 pieces in red hawthorn.

The number of seedlings in the experimental plots in Mingchinor forestry department was 37.9 ± 1.9 Pontic hawthorns and 42.9 ± 1.28 red hawthorns, in Matmon forestry department Pontic hawthorn was 40.3 ± 1.45 pieces, red hawthorn was 36.3 ± 1.38 pieces, in Siyab forestry department, 35.8 ± 2.16 Pontic hawthorn and 32.9 ± 1.8 red hawthorn.(Table 4).

The natural recovery rate in the existing hawthorns was found to be good in Siyob forestry department (the homogeneity coefficient is higher than 1,0) and unsatisfactory in Matmon forestry department (the homogeneity coefficient is 0,52). In addition, the natural recovery rate of red hawthorn in Mingchinor forestry department is very low, which requires the measures implementation to promote natural recovery in the area.

IV. CONCLUSION

The observations analysis shows that we can see that Figure 2 is superior to other forms in all respects among the selected forms in the Kitob state forestry area. We can see that this form is 11,8-18,7% higher in fruit diameter, 13,3% in fruit length, 33,3-45,4% in fruit weight, 14,3-33,3% in seed weight and 2.0-4.6% higher in core yield than the control variant and other forms. The natural recovery rate of hawthorns in Kitob state forestry area varies across forestry departments, and we can see that the figures in Siyab forestry department are very high(homogeneity coefficient 1,3 in Pontic hawthorn; red hawthorn 1,1) . Due to the very low natural regeneration rate in the Mingchinor forestry department, additional forestry measures need to be implemented in these areas.

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- [8] Currently, there are about 250,000 angiosperms species on our planet. Due to biological characteristics, only their small part can be used as fruit and berry crops. A great deal of plant species with fruits suitable for human consumption has a tropical and subtropical range, which makes it impossible to grow them in the open ground of the CBR region.
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