

**NATURAL REGENERATION OF SCOTS PINE
IN KOLKY STATE FOREST ENTERPRISE IN
VOLYN REGION**

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The assessment of natural regeneration of Scots Pine under the shelter of mature forest in areas of Kolky forest enterprise situated in Volyn region presented in the paper.

Natural regeneration, Scots pine, shelter, subor, undergrowth.

Long-term experience showed that methods of forest management, which were used in our country during the last century, are not able to attain the maximal regeneration of high-productive pine stands, as were based on clear-cuts and on artificial regeneration of the forest. Modern stage of forestry development in Ukraine and in the world characterized by the increasing of interest to methods of how to regenerate and save forest resources by using seed potential of the trees.

In our state more frequent appears the question of forest management based on principles of the ecologically oriented forestry, which includes providing of new, more stable, economically and ecologically preferable methods of renewal of forest resources. Natural regeneration of the forest can be that method which will help to increase the productivity of the forests in Ukraine, improve their ecological situation and decrease the outcomes for regeneration, as naturally regenerated stands are those individuals, which during all stages of their development are very competitive, and more adapted to the place of their growth.

Researches P.M. Megalinskyi [5], V.P. Tymofeev, V.N. Abramov, M.I. Gordienko [3], M. I. Saharov, M.V. Zabelin [1], S.N. Sannikov [4] and others during their live were interested in natural regeneration of Scots pine on the clear-cuts and under the shelter of mature stand, many studies were written on this topic.

An aim of research studying the process of natural regeneration of Scots pine under the shelter of the mature stand in fresh and moist subors, searching for the forest methods of its achievement and possibility to use it during the forest regeneration in Kolky forest enterprise; studying the influence of density of the mature stand on appearance and development of natural regeneration.

Material and methods of the research The study used the following methods: Forestry (while making sample plots and during study of seed natural forest regeneration), forestry and environmental (to analyze the Forest and typological characteristics of the stands), mathematics and statistics (during processing, analysis and grouping received data).

The object of study is the process of natural regeneration under the canopy of pine stand in fresh and moist pine forests of Kolky forest enterprise.

To evaluate the success of natural regeneration of Scots pine we used next follows: to determine its quality and quantity, character of its placement in the area, viability, height structure.

To study the natural regeneration of Scots pine 8 sample plots were estimated in stands of Kolky forest enterprise. Silvicultural characteristics are represented in Table. 1.

1. Silvicultural characteristic of the forest stands on temporary sample plots

№	Age, years	Composition	Density	Site index	Average		Stock, m ³ /and
					height (H), m	diameter (D), cm	
1	82	10 Sp	0,57	B3	24	26,3	290
2	81	10 Sp	0,48	B2	24	28,3	250
3	81	10 Sp	0,72	B3	25	31,9	390
4	86	10 Sp	0,64	B2	24	28,0	320
5	83	10 Sp	0,52	B3	23	26,0	250
6	82	10 Sp	0,75	B2	25	30,0	400
7	81	10 Sp	0,80	B3	24	30,0	420
8	82	10 Sp	0,67	B2	23	28,0	320

To count the natural regeneration method of S. Pyatnickyi was used which consists in laying and measuring regeneration on the test areas 10 × 10 m (100 m²). Test area must be at least 2 % of the stand area and be placed evenly over its area. Assessment of natural regeneration provided on a scale V. Nesterov [1]. To study the under-canopy grass plants we followed the scale of N. Bazylevych [2].

Our studies have shown that there is significant proportion of viable natural regeneration of Scots pine under the forest canopy in fresh and moist pine forests (Table 2).

However, more suitable for natural regeneration of Scots pine in the enterprise is moist pine forests compared to fresh. Maximum number of natural regeneration of pine - 2.8 ths · ha⁻¹ was detected in the conditions of moist pine forests.

Much of moisture led to massive expansion of grass vegetation, which interferes with the growth and development of seedlings. That is why on the plots laid in moist pine forests satisfactory and poor natural regeneration dominates. In fresh pine forests of pine regeneration was rated as poor because the maximum number of seedlings detected on one of the plots was only 1.9 thousand units $\cdot \text{ha}^{-1}$.

2. Characteristics of natural regeneration on sample plots

№	Mature stand		Site index	Amount of seedlings, ths $\cdot \text{ha}^{-1}$	Prevailing group of heights	Category of success of renewal
	composition	density				
1	10Sp	0,6	B3	2,8	Large	Satisfactory
2	10Sp	0,5	B2	0,8	Large	Weak
3	10Sp	0,7	B3	1,6	Large	Satisfactory
4	10Sp	0,6	B2	1,9	Average	Weak
5	10Sp	0,5	B3	1,3	Average	Weak
6	10Sp	0,8	B2	0,8	Average	Bad
7	10Sp	0,8	B3	0,9	Average	Bad
8	10Sp	0,7	B2	1,3	Average	Weak

In terms of fresh and moist pine forests naturally pine regenerates better in stands with density 0.6 and 0.7 (Fig. 1, 2).

Minimum number of viable seedlings observed under the canopy with density 0.8 (fresh Subir - 0.8 ths $\cdot \text{ha}^{-1}$ moist - 0.9 ths $\cdot \text{ha}^{-1}$) in plots where natural regeneration was evaluated as bad. High density of mature stand affects the survival of seedlings, it leads to the weakening and destruction.

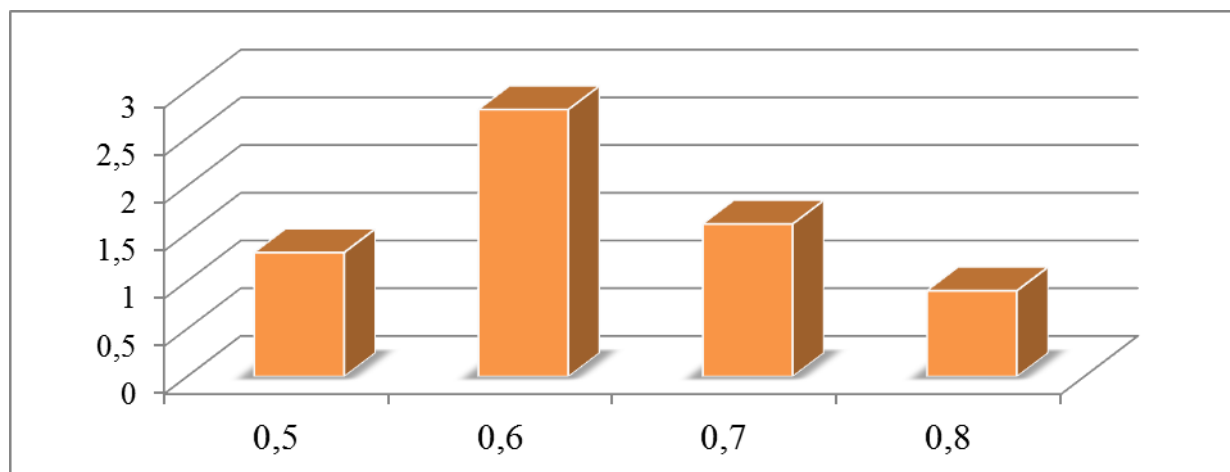


Figure.1. Number of naturally regenerated seedling of Scots pine, depending on the density of mature stand in moist pine forests

Increasing of weeds growth under the canopy reduces the amount of natural regeneration of Scots pine. In the plots laid under the canopy with the density of the mature stand 0.5 natural regeneration was assessed as weak. Despite a fair amount of light, seedlings in such conditions can't compete with grass vegetation.

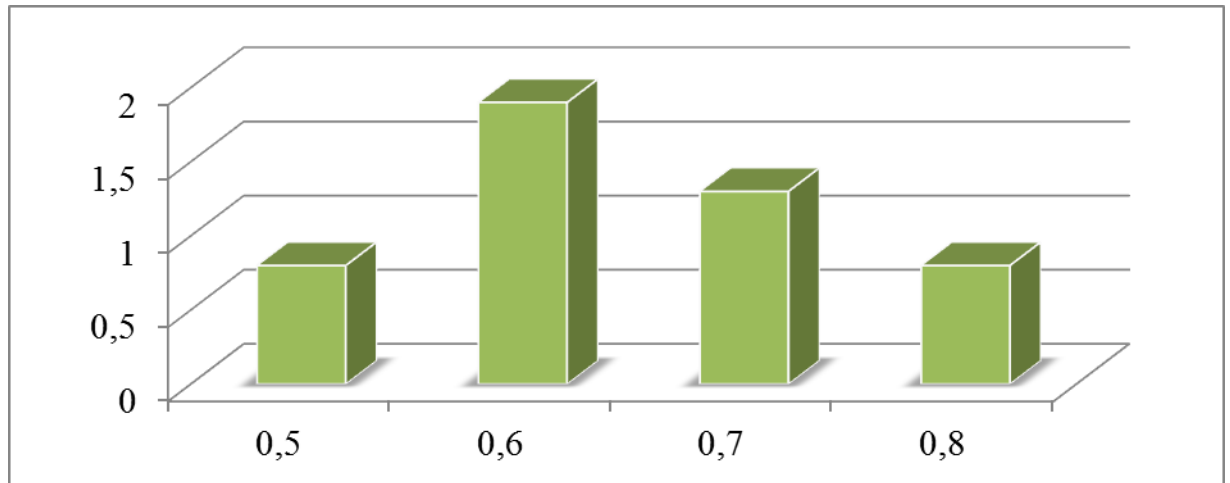


Figure.1. Number of naturally regenerated seedling of Scots pine, depending on the density of mature stand in fresh pine forests

Analyzing the distribution of pine seedlings quality should mentioned that healthy specimens are very frequent.

Conclusions

1. Illumination, the density of grass cover, different density of mature stand lead to the formation of different amount of seedlings with different quality. Naturally regenerated Seedlings are placed unevenly, mainly in groups, much of them occurs in the windows of the stand, and in places with less development of grass vegetation and undergrowth.
2. The best natural regeneration of stands is in the density of mature stand of 6,0-0,7 (1,6-2,8 ths · ha ⁻¹). Minimum number of viable seedlings observed in stands with density of 0.5 and 0.8 and it is 0. ths · ha ⁻¹.
3. Natural regeneration of Scots pine effectively in moister pine forests (0,9-2,8 ths · ha ⁻¹) than in the fresh pine forests (0,8-1,9 ths · ha ⁻¹)