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KEY FEARTURES AND MAIN ISSUES IN FORESTRY IN EASTERN POLISSYA

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ABSTRACT

This study presents and analyzes features of the best practices for the restoration of forests on lands that had previously been utilized for agricultural purposes. Furthermore, evidence is presented which describes the most successful techniques to restore forest communities.

KEY WORDS: Afforestation, non-forest land, site conditions, forest cultures, main species, scheme of mixing of tree species, survival of planted trees

INTRODUCTION

In the current transition to sustainable forest management in Ukraine in general and in some specific regions, particularly the eastern Polissya, reforestation has taken the role of a stabilizer and meliorate environment. The value of this activity is multi-faceted. Afforestated areas with no signs of forest ecosystems significantly increase the efficiency of land that is otherwise unsuitable for agricultural use. There now are about 5 million hectares of such lands in Ukraine: of this amount about 500,000 hectares in eastern Polissya are also unsuitable for agricultural production [6]. Other benefits of the newly created forests are that they securely protect the soil from weathering, improve hydrological and microclimatic conditions of the territory and increase crop yields on adjacent lands. Over time, the newly created forests increase potential timber resource capacity, and will increase recreational value and capacity as well as generally improving the environmental conditions in the region [5].

These benefits lend importance to discussing the successful afforestation experiences in the region and identifying the potential areas for improvement of existing afforested locations. Particularly important are these generalizations in the context of the state target program "Forests of Ukraine" for 2010-2015, which was predicted to create more than 450 thousand hectares of new forests, much of this in Eastern Polissya [1].

OBJECTIVES: The aim of this research is to summarize the experience of afforestation research and an analysis of the establishment of plantations by the foresters of State Enterprise (SE) "Shostkinsky Forestry" on land that had previously been used for agriculture and a discussion about evidence-based suggestions for the improvement of these forests.

DATA AND METHODOLOGY

The focus of this research is on the process of afforestation that was developed on previously cultivated lands in the old arable land region by SE "Shostynske Forestry ".

The study examines the afforestation techniques that were used in recent years by foresters in Eastern Polissya. To achieve these goals we used both conventional methods of scientific knowledge (analysis, synthesis, comparison) and conventional methods in forestry research.

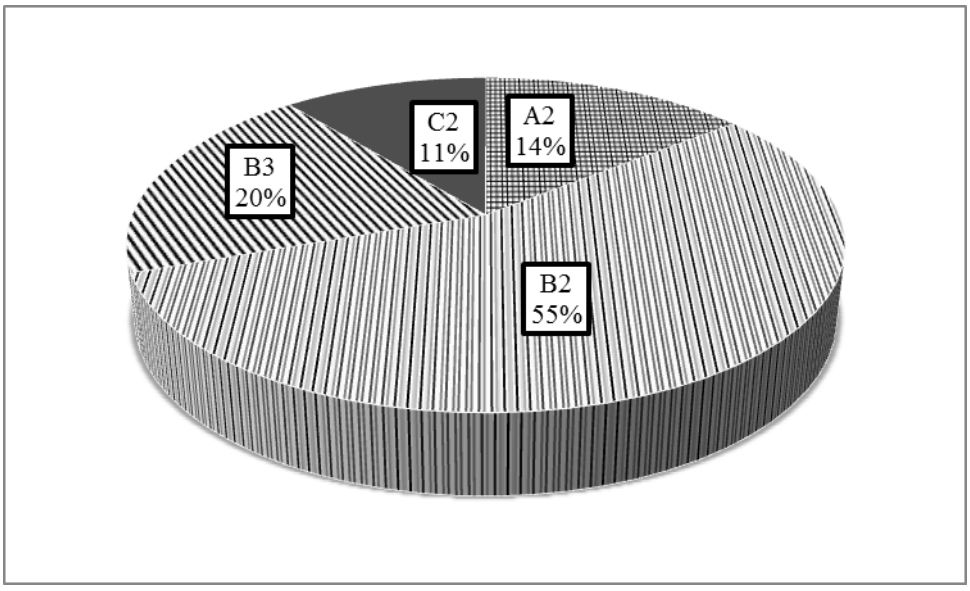
RESULTS AND DISCUSSION

Research has revealed rather significant fluctuations in afforestation in recent years due to various reasons. Most new forest was created in 2008 – 2009, including non-forest areas that are of unchanged use or inappropriately transferred lands to companies, with the direction of the management by the State Forestry Committee of Ukraine. Due to the global economic crisis and violations detected by regulatory authorities, the rate of afforestation in the region and the country as a whole, in the following 2010 - 2012 significantly (2 - 3 times) decreased. The main reasons that led

to the reduction of afforestation during this period can be primarily attributed to the problem of land surveys and transfer of the lands for afforestation, the value of which now remains extremely significant due to various other factors, such as lack of funding and planning mistakes in the past. An urgent problem for reforestation is having legal documents by the State Agency of Forest Resources Ukraine that was planned to be resolved by the end of 2013. In particular, the agency's plan was to provide documents of title to more than 30 thousand hectares of land designated for afforestation in Ukraine as a whole, of which about only 400 hectares are in Eastern Polissya.

Studies have shown (Fig. 1), about ¾ of the new forests in the region are created in newly planted pine forests (55%) and pine forests with high ground moisture (20 %). Much less is the area of plantations laid on land with no signs of forest biogeocenosis in newly planted forests (14%) and complex pine forests (11%).

Figure 1. The share of afforestation in the last 8 years by the types of forest site conditions



During the process of afforestation, tillage in the forest plantations is 100% mechanized. Among the methods used are partially mechanized tillage furrows that are formed mainly by scrub forest plows PCL-70. In the zonal sod-podzolic soils, which dominate the region, the soil is prepared by laying strip furrows which inhibit

the growth and development of forest vegetation. Seedlings of forest species fall into the soil which are lacking nutrients, between rows of forest crops, are not destroyed by grass vegetation which is characterized by non-forest areas. Therefore, the application of this method in areas where there are no signs of forest ecosystems, but instead are dominated by fallow herbaceous vegetation characteristic of non-forest land, is not feasible in most cases. Tillage of furrows does not encourage mechanized planting of seedlings, which in the region is the only method of laying new forests. On the other hand, it is less than a continuous way of tillage, depriving reforestation area of non-forest characteristics that impede the development of existing plants during growth of forest crops. In all cases, allowing of continuous tillage preference should be given; therefore, making it suitable for the specific conditions of reforestation in the area. For the better growth of root system of plants in row plantations, there should be deep loosening of soil by tillage plows RN-60 or RN-80 [7]. The widespread use of continuous tillage not only improves the quality of these silvicultural activities but also helps increase the proportion of mechanized planting of new forests, which is especially important in view of the significant afforestation noted in the national target program "Forests of Ukraine" for 2010-2015.

Estimations of prevailing patterns are carried out according to the plantations book SE "Shostkinsky Forestry" which discusses mixing species in cultures, their compliance with the predominant types of forest site conditions, and applicable initial seedling density for afforestation [3]. The analysis of these materials shows the use of a differentiated approach to the selection scheme of blending various species, which takes into account not only the forest site area designated for afforestation, but also its environmental features (Table 1).

Table 1. The dynamics of differing composition of forested areas, which are oriented on the use of mixing species scheme in the region established during the process of afforestation for the years 2006-2012

Numbers in hectares

Years		2006	2007	2008	2009	2010	2011	2012	Total	%
Types of plantations that are created by the scheme	***Pure pine***	6,4			4,1		15		25,5	5,48
	Pure birch		30	78,6	92,1	25,1	15		240,8	51,75
	Pure oak			33,0	33,0				66,0	14,18
	Pine-Birch	20,5	11,1	8,5	13,9	5	26		85,0	18,27
	Pine-Oak				7			41	48,0	10,32
Total		**26,9**	**41,1**	**120,1**	**150,1**	**30,1**	**56**	**41**	**465,3**	**100**

As the table shows, the main species of afforestation in the area are hanging birch (51.7 %), Scots pine (34.1 %) and red and English oak (14.2 %). From the foresters' perspective, taking into account the prevailing types of vegetation in Eastern Polissya of cultivated areas designated for afforestation, it is not appropriate to plant forest of pure oak and pine. Therefore, a relatively high proportion of pure cultures of the composition of these species is not valid. Especially when you consider the current requirements of "Rules of Replanted Forests" [8], according to this, pure progeny are permitted only on very tough site conditions (A_0, A_1), and in all other cases it is necessary to exclusively plant mixed forests.

In this context, the evidence suggests the benefits of planting pioneer species, including hanging birch first or using them for forest plantations on suitable areas for this purpose. It makes sense to introduce it in pine plantations in areas with already suitable conditions that involve reproducing forests that are similar in composition and structure to native stands pine-birch forests. It should be remembered that the admixture of hanging birch improves the fertility of the soil, creates favorable conditions for the growth, and development of pine in cultures [2].

Special attention during afforestation is the introduction of shrubs to the plantations to form the undergrowth - playing an important component of forest biogeocenosis. The proportion of forest shrubs growing seedlings in nurseries, including elderberry, red and black, hazel, euonymus, buckthorn, and others should be increased.

In planting of new forests dominated in their composition by the main trees species in areas with no signs of forest ecosystems, it is important to use mycorrhiza propagating material with closed (not injured) root systems [4].

The initial planting density for afforestation depends on the type of forest site conditions and ranges from 10 thousand per hectare in the woods to about 3 thousand per hectare in sudibrova. These types of cultures creates a wide spacing of 2.0 - 3.5 m and a step in the planting row of 0.5 - 0.7 (0.75) m, at least 1.0 m. As a rule, foresters planting new forests use the same type of layouts, specific to the respective site conditions used in reforestation, which may not always be justified. This type of layout does not always taken into account soil fertility and architecture of soil horizons especially in non-forest lands. Trying to grow high-producing seedlings on depleted arable lands, as soon as possible, leads to a decrease in their biological stability. It is not appropriate for afforestation to plant at a density 3.5 thousand or less of seedlings per hectare. Since the formation of future forests in the initial stages occurs with non-forest vegetation on reforestation area, this may lead to such negative consequences as the settling of soil leaf-horned beetles larvae, increasing the cost of operations, and reducing the efficiency of water-absorption, decreasing recreational and other useful benefits of forest communities. It should be noted that the benefits of a new forest is when afforestation is the main purpose.

One of the key measures of established afforestation plantations is the survival rate on non-forest lands. The analysis of the survival rate of seedlings planted on old arable land (Table 2) shows the significant influence of climatic factors, quality of planting material, silvicultural operations, and other factors.

Table 2. Dynamics of rooting plantations established during the years 2006-2012 on old arable land by SE "Shostkinsky Forestry"

Numbers in hectares

Years	Survival Rate, %				**Total**
	76-85	86-95	96 і >	Weighted average	
2006	21,4	5,5		82	**26,9**
2007	41,1			80	**41,12**
2008	87,7	32,4		84	**120,1**
2009		82,1	68,0	91	**150,1**
2010		30,1		90	**30,1**
2011	15,0	41,0		88	**56,0**
2012	41,0			80	**41,0**
Total	**206,2**	**191,1**	**68,0**		**465,32**
%	**44,32**	**41,07**	**14,61**		**100**

Only in 2009 and 2010 from the seven years was the survival rate on old arable lands higher than planned. In the other years, during the research period, the average survival rate for the planted woody plants, except in 2011, was less than 85% and ranged from 80 to 84%. Overall the survival rate of plantations on non-forest stands was lower than the plants artificially rooted in the regeneration frames regardless of the years.

Despite the fact that about half of the crops on the old arable land required additional inputs, the plants in the process of afforestation survived.

CONCLUSIONS

It is important to note the generally positive experience of afforestation. Silvicultural practices have certain problems but ways for improvements do exist. In order to best enhance afforestation in Eastern Polissya and in Ukraine in general, it is advisable to understand the following organizational and technological problems and solutions that will facilitate the improvement of quality of afforestation on non-forest land. In particular:

1. The need to clarify the optimal amount of land suitable for afforestation according to the individual conditions of each forest regions.

2. Improving the monitoring, an evaluation of the quality of the plantations, and having proper accounting of the created plantations, taking into account the environmental features on the reforestated land and, thus, justifying future plantings.

3. Avoiding the same approach in creating plantations in areas that have different ecosystem characteristics.

4. Utilizing the most up-to-date approaches and techniques that are current with global trends and regional challenges by using well-developed, scientifically approved and evidence based algorithm approaches on the national level.

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