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THE STATE OF STANDS INVOLVING EUROPEAN SPRUCE IN RIGHT-BANK FOREST-STEPPE ON AN EXAMPLE OF VINNYTSYA FORESTRY AND HUNTING REGIONAL ADMINISTRATION

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Shown processes which were analized by statistic methods, combined dates of forest inventory involving stands of European spruce in Vinnytsya SF and HE within 2007-2011. Analized the dynamics of the area's plantations of spruce and participation of mensurational indices. Defined the conditions that promote growth stands of European spruce in the research region.

Stands, European spruce , forest inventory, forestry , mensurational indices.

The main tree species is the oak in the Right-bank Forest-Steppe of Ukraine , so forestry in this region should be aimed at growing plants of this species. At the same time, the results of studies of many scientists suggest that the introduction of European oak in stands of spruce (*Picea abies* (L.) Karst.) can increase their productivity, without lowering of the output merchantable wood of oak [4, 11]. According to researches of M.A. Golubtsa [3], A.G. Soldatov [14] and S.G. Zrazhva [8] the oak-fir plantations of Podolskiy Steppe and thereafter the Vinnitsa region are observed the highest productivity.

However, in recent years, Ukrainian researchers have noticed a massive desiccation of European spruce on the territory of Ukraine, it happens outside and within its habitat. In most cases desiccation, occurs in pure stands and much less - in mixed.

Intensive drying of spruce stands observed in neighboring countries, particularly the area of Poland stands that shrink is more than 200 thous. hectares [15] and in Russia - 300 thous. hectares [7].

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The scientists concluded that the causes of desiccation may be the extreme differences of the temperatures and humidity of the air [13], defeats tree of pathogens and pests [9, 12], sudden changes in the humidity of topsoil, where is the bulk of the root systems based in [6], long-term drought and water shortage [1, 10]. However, the most authors believe that the main problem for the emergence from the above reasons is climate change [1, 6, 9, 10, 12, 13].

The purpose - the determination of the state, dynamics and mensurational indices of stands involving European spruce in Right-Bank Forest-Steppe with the example of Vinnytsya State Forest and Hunting Enterprise (Vinnytsya SF and HE).

Materials and Methods. The objects of researches were pure and mixed stands of European spruce of Vinnytsya SF and HE included database of forest management in 2007 and 2011. The statistical analysis of these datas allowed us to obtain the dynamic of the area of stands of European spruce and install them middle-forestry mensurational indices. The last datas calculated as a weighted average over the area gathered on the basis of its distribution for parameters [2].

The results. As a result of our researches were showed the tendency to increasing the area of plantations of European spruce with advancement to the north of the geographical center of the region (Nemirovskiy district between villages Nykyforivtsi and Luka), and to decreasing in a southerly direction. This fact can be explained fastidiousness spruce to the soil and air moisture, therefore it was often injected in northern vegetation composition, preferably most areas Vinnytsya region.

According to the forest inventory (2011) in Vinnytsya SF and HE the growing in the composition of spruces` plantations on the area of 17134.2 hectares, with much of it (4144.7 ha.) is confined to the forests of SE "Vinnitsya FE" (Fig. 1) and SE "Illintsi FE" - 3316,7 ha. The least quantity of spruce plantations are growing in SE "Chechelnyk FE" - 70.1 hectares and the "Yampolsky FE" - 27,2 hectares.

Between 2007 and 2011 the area of the artificial plantations involving European spruce in Vinnytsya SF and HE increased by 952,9 hectares (5,9 %), of which 706,1 ha (4,4 %) was established in the SE "Vinnitsya FE".

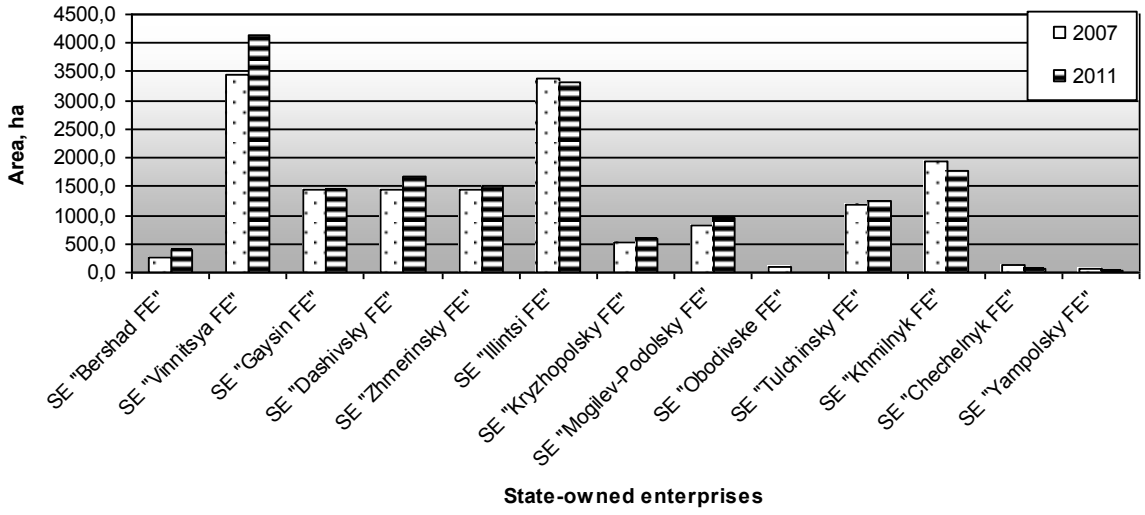

Fig. 1. The dynamic of the area plantations involving European spruce in state-owned enterprises of Vinnytsya State Forest and Hunting Enterprise.

The analis of data researches suggests the successful growth stands involving spruce in region of studies. In particular, this is indicated by high rates quality of stand of growth class (Fig. 2).

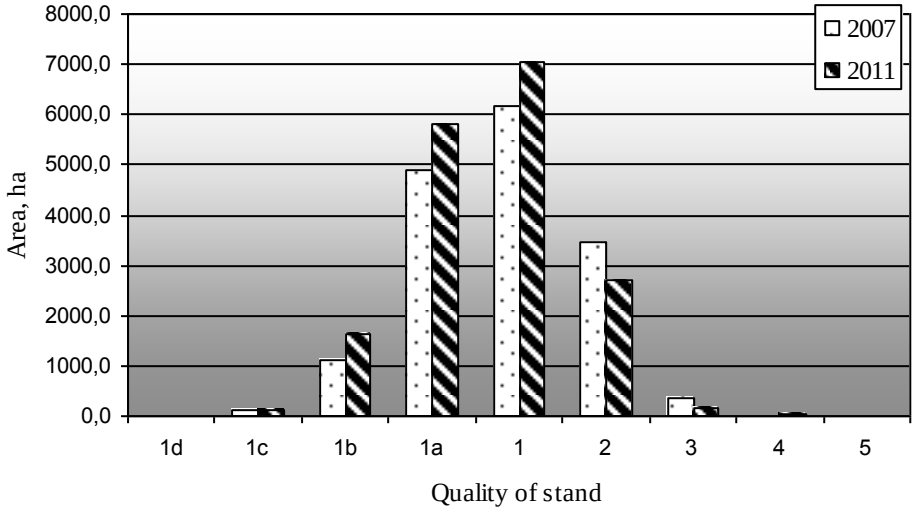

Fig. 2. The dynamic of the area involving the spruce stands on its quality of stand.

As shown in Figure 2, the vast majority of European spruce plants grow in plantations for classes 1 and 1^a 's quality of stand. Average of quality of stand of 2011 stood at 1^a,6 (Tabl.), or 12 % growth over 2007 (1^a,8), indicating in region of study of the presence of favorable conditions for successful growth stands of spruce. Confirmed by the findings serve as a distribution area of plantations involving

European spruce in Vinnytsya SF and HE by type of forest conditions, under which 82,2 % of them grow in fresh hornbeam woods.

Increasing of average growth parameters of quality of stand in European spruce stands, with its adverse climate change, could as occur a result of apostasy of spruce trees which are not biologically sustainable, low productive.

The average values of forest-measured parameters of European spruce stands in Vinnytsya State Forest and Hunting Enterprise.

Mensurational indices	Year	
	2007	2011
Age, years	43,5	46,0
Stock $m^3 \cdot ha^{-1}$	53,5	39,9
Share of participation	1,9	1,4
Height, m	17,2	18,7
Diameter, cm	20,7	22,5
Density of stocking	0,76	0,76
Quality of stand	1^a,8	1^a,6

The average index of density of stocking in European spruce plantations for a given period of time has not changed and is 0,76.

The negative is increasing of the average age of the plants of European spruce from 43,5 years – 2007 to 46,0 years – 2011. Whereas, spruce in the age over 45 outside of the growth habitat, there is the appearance of the root rot pathogens on the root system, leading to a weakening of its biological stability.

It should be mentioned, that with increasing of age of spruce trees there was a noticeable increasing their average diameter from 20,7 cm (2007) to 22,5 cm (2011) that the percentage is 9,1 %, and the average height from 17,2 m (2007) to 18,7 m (2011) - 8,8 %. In large areas, the spruce increases with diameter ≥ 30 cm and a height of more than ≥ 22 m, indicating the high performance and sort tree structure of this species.

As already noted, the area of spruce stands in the region grew by 5,9 %, but there is a tendency to reduce its share in the composition of plantations (Fig. 3).

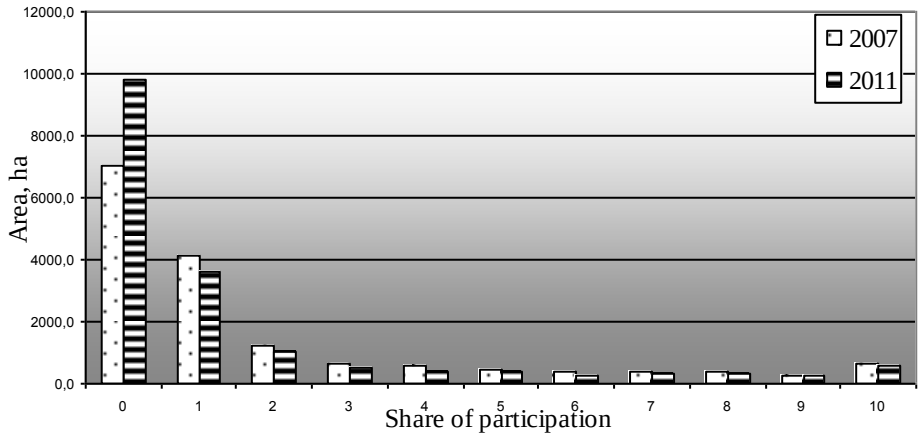

Fig. 3. The dynamic of the area of plantation with share in the stock of European spruce

So, for five years, the area of pure spruce stands decreased by 14,0 %, from 675 ha - 2007 to 592,4 ha - 2011, and the average stake of share in mixed stands of spruce decreased by 25 % (from 1,9 in 2007 to 1,4 - in 2011), which may be caused as the removal of spruce trees during thinning and clear cutting and the using of appropriate schemas of mixing in the creation of forest plantations, which provides input spruce separate 4-6 rows trough the main species (oak). The reducing the number of spruce plantations led to the decreasing the average stock of wood by 25,4 % (see Tabl.). The positive development is reducing the proportion of spruce in plantations to the modern parameters (1,4-1,9), whereas this type of mixed stands are marked the high resistance to defeat a pathogens and damage by pests, but it should be marked that under these conditions premature drying of spruce is possible, as in the Forest-Steppe is observed much less durable than in conditions of habitat [5] and usually do not reach the age of maturity adopted for oak . The latter fact should be considered by conducting forestry care plantations involving featuring spruce as untimely detection and removal of weakened trees can lead to the lossing of high-quality wood enterprises .

Conclusions

The analyzed datas show that European spruce stands in Vinnytsya State Forest and Hunting Enterprise at the time of forest management in 2011 is

characterized by high forestry-measured parameters, tends the increasing the area of plantations with spruce.

The share of spruce in plantations decreases, which is a positive fact because mixed stands of this species are observed of the higher resistance to defeat by pathogens and the damage of pests.

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