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ENSURATIONAL CHARACTERISTICS OF VEGETATIVE ORIGIN OAK STANDS IN UKRAINIAN FOREST-STEPPE ZONE

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Main mensuration indices of vegetative origin oak stands in Ukrainian forest-steppe zone based on data of the national forestry database of the Ukrainian Forest Inventory Enterprise (UFIE) "Ukrderzhlisproekt" (01.01.2011) were analyzed.

Key words: forest-steppe, modal stands, oak, mensuration characteristics, vegetative origin stands.

One of the main forest-forming species in Ukraine is oak (Quercus robur L.). It is extensively used as a basis for reducing erosion stands and shelter belts plantings. Oak forests executed multifunctional ecological role and satisfy the economy needs [2]. Currently, the proportion of oak forests is about 28% of the forest areas covered with forest vegetation.

Oak regenerates both via seeds and shoots from the stump. Vegetative origin grows much faster than stands of seed origin, but as for the quality of wood last one is more preferable. Vegetative reproduction is an additional guarantee of the preservation of the species when disturbed the normal functioning of the tree (injury, damage, and cutting), it gives the growth of dormant buds.

Aim of study. The aim of the research was to conduct an analysis of vegetative origin oak stands in Ukrainian forest-steppe zone, which further can be used for dynamic modeling and prediction of growth by main mensuration parameters.

Materials and methods. For statistical analysis the information from the national database of UFIE "Ukrderzhlisproekt" has been used that characterizes pure and mixed stands of oak forests in Ukrainian forest-steppe zone. The total sample size was 207,869 with the total area of 884,709.3 hectares. Next mensuration parameters of the stands were analyzed: land area (S), stand age (A), DBH (D), mean height (H), stand density (P), stand volume on 1 ha (M1ha), standing volume at subcompartment (M), site class (B), forest type and stand composition. For data analysis the general principles of mathematical statistics and methods applied in forest mensuration were used [3].

Results. On the territory of Ukrainian forest-steppe zone vegetative origin common oak stands occupy 26.8% of the total area of forests occupied by common oak. Growth of oak is mainly accompanied by secondary species. Age groups consist of the following age 10-years classes: young - I-II, middle-aged - III-V, pre mature - VI, mature - VII-VIII and IX and overmature [4]. Distribution of areas of forests and average productivity of vegetative oak stands by age structure shown in Table. 1.

1. Areas and average productivity of vegetative origin oak stands by age structure

Index	Total	Among of age groups				
		young	middle- up	approaching maturity	ripe	overmature
Area, ha	228187	328	3725	8122	52407	163606
Growing stock, m^3	60085579	14232	548792	1641020	12661398	45220137
The average productivity $m^3 \cdot ha^{-1}$	263	24	145	220	262	287

As shown in the Table 1 in the studied sample at least part of the area is occupied by young, that is up to 20 years old, representing 0.1% of the total area, occupied by middle aged 1.6%, pre-mature - 3.6 %, mature - 23.0 %, over mature make up the largest share of -71.7 % of the total area. Distribution of growing

stock in next: young - 0.02%, middle- up - 0.9 % approaching maturity - 2.7 %, ripe - 21.1 %, overmature - 75.3 %. Average age of vegetative oaks stands is 89 years. This age distribution areas and stocks oak stands are the result of insufficient cuts in the past.

Distribution of vegetative origin oak stands of stocking is shown in Fig. 1

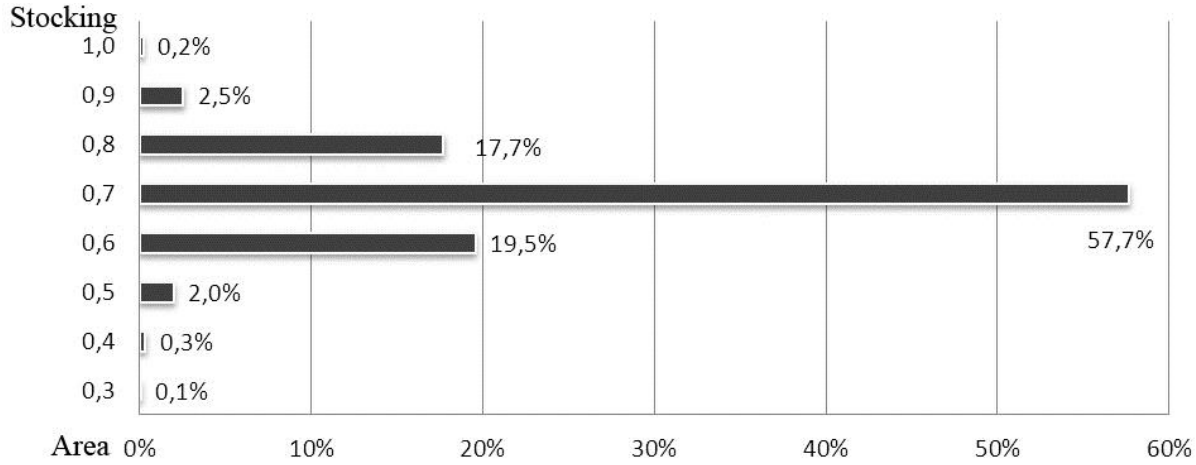

Fig. 1. Distribution of oak stands by stocking

From the data in Fig. 1 one can note the predominance of stands with the fullness of 0.7, which fully corresponds to the average completeness. Under stocked and overstocked stands almost absent, indicating that proper forest management in the studied stands.

Due to the fact that age is a key indicator during the most important forest management measures more detailed analysis needs of average mensuration parameters of age classes, which is shown in Table. 2.

In calculating the data in table hectare reserve was defined as the proportion of the total stock of sites and areas, the remaining parameters as weighted average was located across the square plots.

It should be noted that the average participation rate of oak stands is 70.7%, and the proportion of oak stands is 4 units or less is 17.0% of the total subcompartment.

2. Mensuration parameters of vegetative origin oak stands in Ukrainian forest-steppe zone by age-classes

Class age	Total area of subcompartment, ha	Standing volume of oak, m3 · ha-1	Average height, m	Average diameter, cm	Relative completeness	Growth class
I	61,0	7,0	2,8	3,6	0,77	II,2
II	266,5	17,8	7,1	9,6	0,76	I,9
III	568,1	35,3	10,8	13,5	0,76	II,8
IV	866,9	60,3	14,6	17,3	0,74	II,4
V	2290,0	88,0	17,3	20,7	0,75	II,3
VI	8122,0	109,9	19,6	24,0	0,74	II,3
VII	21489,3	136,7	21,2	26,5	0,72	II,2
VIII	30915,5	161,3	22,7	28,9	0,70	II,2
IX	53878,7	192,3	23,8	31,8	0,69	II,2
X	58237,5	201,4	24,7	34,1	0,67	II,1
XI	24677,8	210,8	25,6	37,5	0,66	II,1
XII	11969,8	211,2	26,1	39,9	0,63	II,1
XIII	8594,2	222,6	26,9	42,9	0,60	II,0
XIV	3971,3	231,5	27,5	45,1	0,59	I,9
XV	1282,4	230,9	27,6	47,5	0,55	I,9
Average values	-	185,0	23,9	32,7	0,69	II,1

One of the key indicators of performance stands is a site class. Distribution of area of oak stands in Ukrainian forest-steppe by site classes shown in Fig. 2.

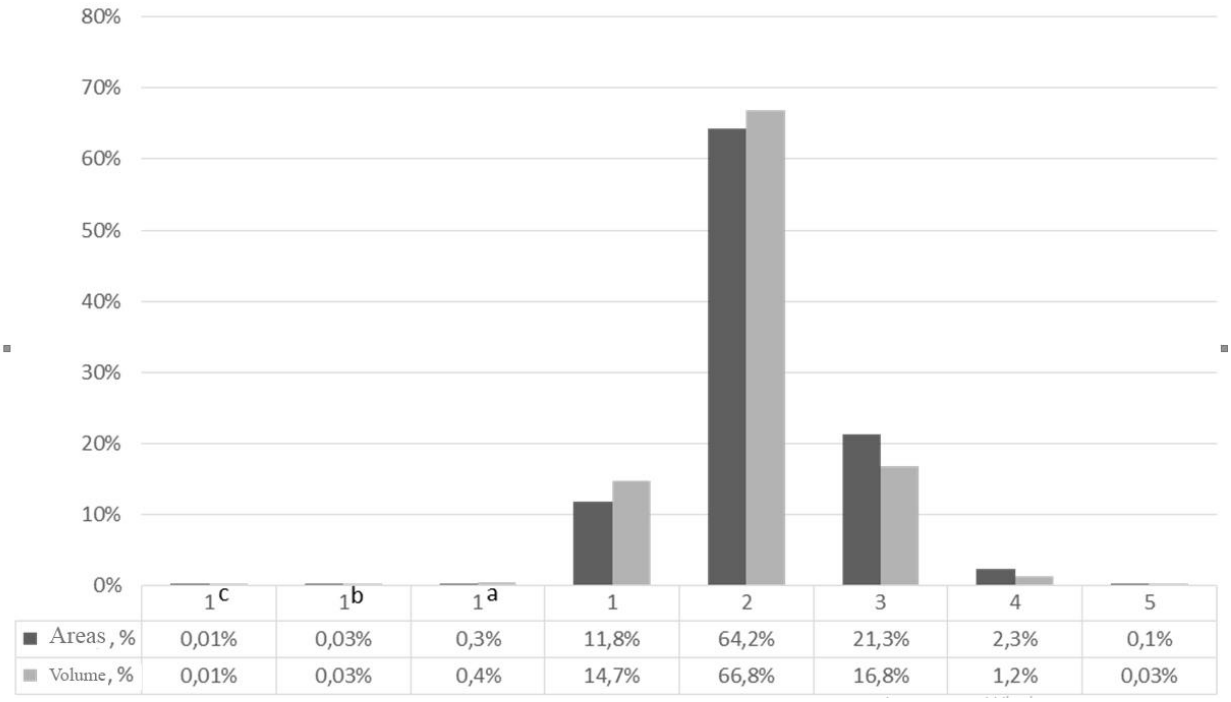

Figure 2 Distribution of areas and volume of oak by site classes

According to the data shown in Fig. 2 it can be observed that the bulk of the occupied spaces are I - III site classes, there are also stands I^a , I^b and I^c site classes, that make up a small part low productivity stands that require improving of forest management in these stands [1,2,4].

The important factors that affect the performance space, is the forest type. Data on the distribution of stock by forest types shown in Fig. 3.

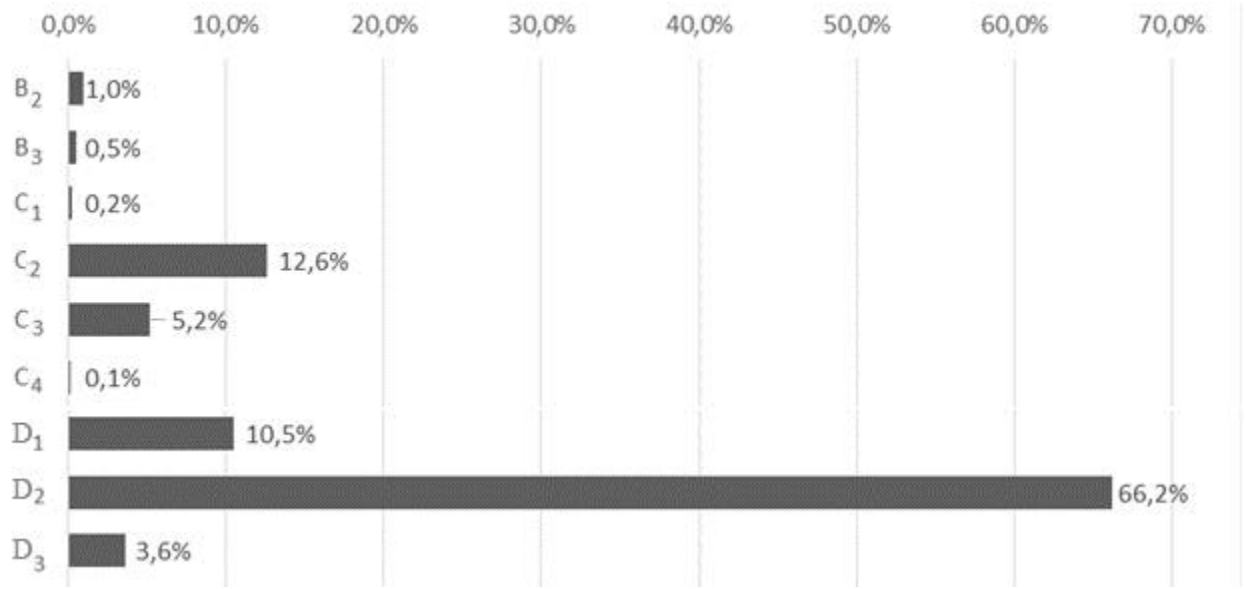

Figure 3. The distribution of oak stands by forest types

The data in Fig. 3 shows that predominantly oak stands is growing on fertile soil: in a D_2 increases 66,2%, D_1 - 10,4%, D_3 - 3,7%, the rest (19,7 %) are pine forest type and fairly fertile oak forest type, very small share in infertile pine site type, with a trend of oak growth in fresh and wet conditions.

Conclusions

Summarizing the above analysis it should be noted that among the oak stands in Ukrainian forest-steppe zone a significant portion (26.8%) are vegetative origin stands, whose biological properties and mensuration characteristics significantly different from the seed origin thus require a more detailed study of the processes of growth.

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