STANDARDS FOR ASSESSMENT OF THE COMMODITY STRUCTURE OF BEECH STANDS OVERGROWTH IN FORESTS OF UKRAINIAN CARPATHIANS

S. Haychuk, O. Girs

Abstract. *Merchantable stand structure standards of overmature European beech Fagus sylvatica L. developed by A.A. Strochynskyi in 2004 are used nowadays in Ukraine. However, it is known that tree stands of different age classes drastically differ with their structure, i.e. diameter. Moreover, the diameter distribution of trees has great influence on value and qualitative parameters of stand volume. Over 35 thousand hectares of overmature beech stands are grown in the Ukrainian Carpathians nowadays and are in the need of modernenhanced standards for the evaluation of their qualitative structure.*

As a result of our calculations, we obtained diameter distributions of both even- and uneven-aged (1st and 2nd storeys) overmature beech stands. Using obtained results and the log quality tables new merchantable stand structure standards were calculated. Afterwards, these standards were checked and evened in order to avoid calculation errors.

Standards that are shown in our study are valuable for the practical use in both forest management practice and forest management planning. After the pilot testing and the evaluation of their accuracy, these standards may be used instead of those, which are used in Ukraine nowadays.

Keywords*: overmature beech stands, combined enumeration, age group stands.*

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DYNAMICS OF MENSURATIONAL PARAMETERS OF STANDS OF STATE ORGANIZATION “RESIDENCE “ZALISSYA”

M. O. LAKYDA, Ph.D. student *

National University of Life and Environmental Sciences of Ukraine

E-mail: maryna.linevych@gmail.com

Abstract. *Within the scope of this article, we have analyzed the dynamics of mensurational parameters of forest stands of State organization “Residence “Zalissya”. The provided distribution by area and growing stock, tree species composition, age groups and site index classes proves high productivity level of the studied stands and positive trends in their bioproduction processes.*

Keywords: *State organization “Residence “Zalissya”, forest stands, productivity, mensurational parameters, distribution.*

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* *Scientific advisor – doctor of agricultural sciences, associate professor R. D. Vasylyshyn.*

It is known that forests play a very important role in development of human civilization. They serve not only as a source of timber and non-timber forest products, but also as a protective component of the environment. Primary priority of ecological role of forest formations becomes more and more evident during the modern anthropogenic period, which is marked by disturbance of carbon-oxygen balance of the planet [3, 6].

Introduction. The forecasted global climate changes will cast a dramatic impact upon forests. This will lead to deterioration of their functions, which are essential for humanity. Therefore, environmental monitoring both on global and regional level is an integral part of comprehensive study of ecological role of forests [1, 2].

Forest stands of the State organization “Residence “Zalissya” are attributed as forests of nature-conservative, historical and cultural, and scientific purpose, since they play an important role in sustaining ecological balance of the surrounding territory, and serve as restoration and conservation point for rare fauna and flora. Thus, amongst the main aims of the enterprise – not only forestry, but also hunting and game management, oriented at creation of favorable conditions for improvement and increasing number of populations of rare animals. According to a Decree of President of Ukraine from December 11, 2009, on the territory of SO “Residence” Zalissya” a National Nature Park was created. Thus, until now the establishment functions as a State Residence.

The purpose of the research is to perform a retrospective analysis of mensurational parameters of stands of the main forest forming tree species of SO “Residence “Zalissya”.

Materials and methods. In the course of the research, we have applied the information base of data bank “Forest fund of Ukraine”. The technology of continuous forest inventory is grounded on the abovementioned basis. We have acquired mensurational characteristics of stands of SO “Residence “Zalissya” and processed the forest inventory data from 1963 till 2011 years.

During the research we have characterized particular parameters of forest fund:

- distribution of area covered by forest vegetation and its growing stock by groups of forest forming tree species;
- distribution of growing stock of forest stands by age groups (young, mid-aged, immature, mature and overmature);
- mean site index class (after Prof. M.M. Orlov) within the groups of forst forming tree species.

Results. When analyzing changes of area and growing stock of areas covered with forest vegetation within the specified time frame, we could discover that the economy on the enterprise is being led on rather high efficiency level. An evidence for that is 2.4 times increase of growing stock of forest stands (comparing the end of the research period to its beginning), which is considered to be significant. The area covered with forest vegetation at the same time has increased 1.4 times (Table 1). Since the predominant site conditions class on the territory of the Residence is relatively infertile type,

the economy is oriented on growing coniferous tree species with prevalence of Scots pine (*Pinus sylvestris L.*). In general, as of 01.01.2011, growing stock of a group of coniferous species equals 89.6 % from the total. It should also be noted that during the first ten years of the study period there has been a considerable increase of forest covered area. We recognize expansion of borders of the Residence and transfer of over 2.5 thou. ha of forest covered land to its subordination as the reason for this phenomenon.

1. Dynamics of distribution of area and growing stock of forest area covered with forest vegetation by groups of forest forming tree species

Year of inventory	Area, ha / Growing stock, thou. m^3 / Growing stock percentage			
	Total	incl. by groups of forest forming tree species		
		conifers	hardwood broadleaves	softwood broadleaves
1963	9065	8094	287	684
	1758.5	1636.5	43.9	78.1
	100.0	93.1	2.5	4.4
1973	11832	9967	813	1052
	2511.1	2274.4	108	128.7
	100.0	90.6	4.3	5.1
1983	12205	10275	952	978
	3280.4	2967.3	154.2	158.9
	100.0	90.5	4.7	4.8
1993	12338.5	10445.4	937.5	955.6
	3837.8	3449.3	199.1	189.4
	100.0	89.9	5.2	4.9
2011	12386	10484.1	939.8	962.1
	4217.8	3781.2	226.7	209.9
	100.0	89.6	5.4	5.0

When analyzing the data from table 1, it becomes obvious that share of coniferous group of forest forming tree species in distribution of growing stock has declined. At the same time, the group of hardwood broadleaves is characterized by nearly two times increase of this parameter throughout the study period. Considering the group of softwood broadleaves, it is worth mentioning that its share has increased insignificantly – by 0.6 per cent during the given time period.

Analysis of dynamics of percentage of the main forest forming tree species allows to track changes in share of separate tree species in distribution of growing stock of each group of forest forming tree species (Table 2).

2. Dynamics of growing stock percentage for the main forest forming tree species within groups of forest forming tree species in forests of SO “Residence ”Zalissya”

Year of inventory	Conifers			Hardwood broadleaves			Softwood broadleaves			
	pine	spruce	others	oak	ash	others	alder	birch	aspen	others
1963	100.0	0.0	0.0	55.1	41.5	3.4	59.7	24.6	14.9	0.9
1973	99.9	0.1	0.0	85.1	13.3	1.6	61.9	20.9	13.9	3.3
1983	99.9	0.1	0.0	96.2	1.8	1.9	71.6	17.5	7.7	3.3
1993	99.9	0.1	0.0	95.1	2.9	2.0	68.2	17.3	9.9	4.6
2011	99.9	0.1	0.0	93.9	3.3	2.7	65.2	17.5	11.8	5.6

The prevailing tree species in the group of conifers is Scots pine, there is also a very small amount of Weymouth pine. Separate stands are formed by European spruce and European larch, the latter is considered among other tree species of this group. The group of hardwood broadleaved tree species is identified with a significant increase of share of oak stands in distribution of growing stock throughout the whole study period. As of 01.01.2011, they make up an amount of 93.9 %, whereas at the beginning of the study period there were only 55.1 % of oak stands in the described group. At the same time, percentage of ash stands has decreased to 3.3 % at the end of the period, compared to 41.5 % at the beginning of the period. Specking about the group of softwood broadleaved tree species, we have to remark predominance of alder, birch and aspen stands.

Another element of analysis of productivity of forests of SO “Residence “Zalissya” is review of dynamics of growing stock distribution by age groups (young, mid-aged, immature, mature and overmature) within the groups of forest forming tree species (Table. 3).

3. Dynamics of distribution of growing stock of stands of SO “Residence “Zalissya” by age groups, %

Year of inventory	Conifers				Hardwood broadleaves				Softwood broadleaves			
	young	mid-aged	immature	mature and overmature	young	mid-aged	immature	mature and overmature	young	mid-aged	immature	mature and overmature
1963	35.0	50.3	11.4	3.3	27.3	67.2	5.2	0.0	27.1	43.0	17.7	12.2
1973	30.5	54.7	10.6	4.2	28.1	70.5	1.4	0.1	12.7	48.3	22.6	16.4
1983	18.3	65.3	8.6	7.8	21.3	74.4	3.4	0.9	7.6	39.8	26.5	26.1
1993	11.0	70.7	8.7	9.5	2.5	68.4	28.1	1.1	2.5	23.7	21.1	52.7
2011	3.5	72.7	11.1	12.8	0.3	63.7	33.7	2.4	1.5	5.8	16.2	76.5

The common trend for all groups of forest forming tree species is substantial decrease of share of young stands. The main reason for this is the existing regime of forest management: ban for final felling and decreasing amounts of forest-renovative and sanitary clear cuts. As a consequence if this – absence of free area for afforestation or reforestation and accumulation of a big amount of mature and overmature stands. All this leads to worsening of sanitary condition of the forests. High mean age within the groups of forest forming tree species confirm this statement. At the end of the research period, mean age of the prevailing group of coniferous species was equal to 74 years, when at the beginning of the time frame its value was only 41 years.

Since site index class is a ponderous informational index of forest mensuration, which characterizes productivity level of a stand [4, 5], we consider worthwhile to show dynamics of mean site index classes for the groups of forest forming tree species (Table 4).

4. Dynamics of mean site index class of stands of SO "Residence "Zalissya" by groups of forest forming tree species

Year of inventory	Mean site index class after Prof. M.M. Orlov		
	conifers	hardwood broadleaves	softwood broadleaves
1963	I.3	I.9	II.0
1973	I.1	II.1	I.8
1983	I^a.9	I.9	I.9
1993	I^a.9	I.7	I.8
2011	I^a.9	I.5	I.8

According to the data presented in table 4, it becomes evident that mean site index classes have risen in majority of groups of forest forming tree species. The rate of increase have somewhat slowed down during the last decades in coniferous and softwood broadleaved groups, which is explained by the existing age structure of the studied forests.

Graphical interpretation of dynamics of mean growing stock per area unit for the groups of forest forming tree species (Figure 1) proves increase of this parameter, which is a positive trend. Nevertheless, it should be mentioned that together with age of quantitative exploitability forest stands reach the upper limit of their productivity.

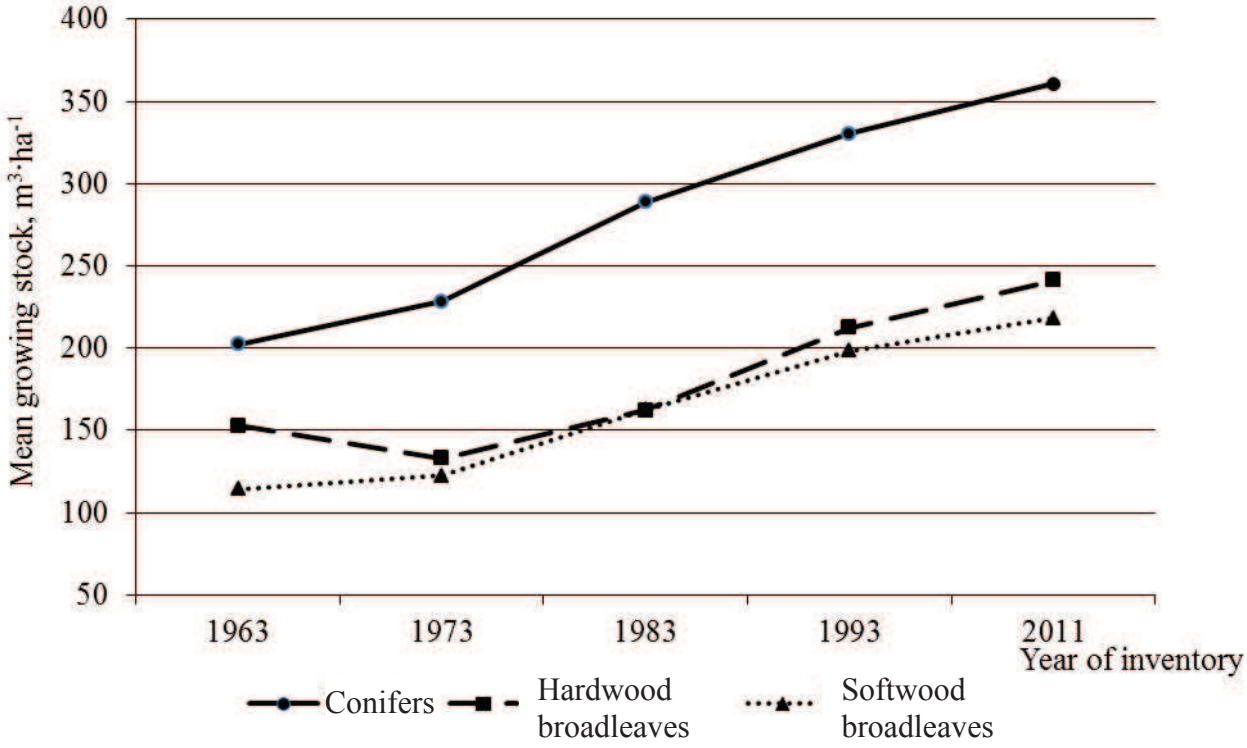

Figure 1. Dynamics of mean growing stock per area unit for the groups of forest forming tree species in SO "Residence "Zalissya"

Conclusions. As a result of the research we reckon up that forest stands of State Organization "Residence "Zalissya" are highly productive, with a substantial mean growing stock per 1 ha of forest area covered with forest vegetation (340 m^3), and mean age of 74 years (as of 01.01.2011). The predominant group of forest forming tree species is coniferous, with prevalence of Scots pine, the share of which in total growing stock is 89.7 %. Speaking about age group distribution, it is worth saying that mid-aged stands are dominant (71.3% by growing stock). The majority of stands are highly productive, with site index classes I^a and I. Generally, the presented data shows positive trends in bioproductional process of forest stands of the State Organization throughout the research period. However, further aging of the existing stands and an insignificant share of young forests will lead to deterioration of rate of performance of such important ecosystem services as carbon sequestration and oxygen production. Therefore, solving this problem requires application of urgent silvicultural measures already today.

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ДИНАМІКА ТАКСАЦІЙНИХ ПОКАЗНИКІВ ДЕРЕВОСТАНІВ ДЕРЖАВНОЇ ОРГАНІЗАЦІЇ «РЕЗИДЕНЦІЯ “ЗАЛІССЯ”»

М. О. Лакида

Анотація. *Проаналізовано динаміку таксаційних параметрів деревостанів Державної організації «Резиденція “Залісся”». Наведено їх розподіл за площею та запасом, породним складом, групами віку та бонітетом у межах груп лісотвірних порід, що дає змогу зробити висновок про високу продуктивність та позитивні тенденції у біопродукційному процесі насаджень резиденції.*

Ключові слова: *Державна організація «Резиденція “Залісся”», деревостан, продуктивність, таксаційні показники, розподіл.*

ДИНАМИКА ТАКСАЦИОННЫХ ПОКАЗАТЕЛЕЙ ДРЕВОСТОЕВ ГОСУДАРСТВЕННОЙ ОРГАНИЗАЦИИ «РЕЗИДЕНЦИЯ “ЗАЛЕСЬЕ”»

М. А. Лакида

Аннотация*. Проанализирована динамика таксационных параметров древостоев Государственной организации «Резиденция “Залесье”». Приведено их распределение по площади и запасу, породному составу, группам возраста и классам бонитета по группам лесообразующих пород, что позволяет сделать выводы о высокой продуктивности и положительных тенденциях биопродукционного процесса насаждений резиденции.*

Ключевые слова: *Государственная организация «Резиденция “Залесье”», древостой, продуктивность, таксационные параметры, распределение.*

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ОСОБЛИВОСТІ ВПЛИВУ УРБАНІЗОВАНОГО СЕРЕДОВИЩА НА ПОВНОДЕРЕВНІСТЬ ДЕРЕВ ГІРКОКАШТАНА ЗВИЧАЙНОГО В ЗЕЛЕНИХ НАСАДЖЕННЯХ МІСТА КИЄВА

О. М. ЛЕСНІК, аспірант*
Національний університет біоресурсів і природокористування України
E-mail: alexlesnik09@ukr.net

Анотація. *Ефективне планування та управління зеленими насадженнями надає широкий спектр переваг для жителів міст. Міські лісові екосистеми забезпечують цілий ряд соціальних та екологічних переваг. Для раціонального управління міськими зеленими насадженнями необхідно володіти достовірною інформацією про конкретний ресурс. Проведено статистичний аналіз дослідних даних.*

*Науковий керівник – доктор сільськогосподарських наук, професор О. А. Гірс.