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### DYNAMICS AND CURRENT STATE OF FORESTS OF ASH FORMATION IN THE REPUBLIC OF BELARUS

The article provides a description of the current state of forest ash formation in Belarus. The data on the dynamics of space ash forests in the period from 1956 to present time have been analyzed measurement areas by groups of age classes. Noted that the decrease in the area of ash at present due to both the mass of desiccation caused by different kinds of diseases, and the insufficient number of departures in the early stages of their formation, as well as the biological features of the ash.

**Introduction.** European ash (*Fraxinus excelsior*) – is a massive tree, usually with a straight full-boled trunk well cleaning of branches. Trees aged 130-150 with average height of 27-32 m and growing stock of 350 m<sup>3</sup>/ha are common in the best conditions of the site. The height and density of ash stand varied depending on the type of the forest [1, 2].

Areal of European ash covers all Western and almost all Southern and Central Europe (Ukraine, Belarus, central districts of European part of the Russian Federation, Middle and Lower Volga, the Crimea), passes by Asia Minor across Turkey, along the northern coast of the Mediterranean Sea. Within its ash areal creates pure trees and more often grows with broadleaved and even coniferous species. It is the best companion for English oak (*Quercus pedunculata*) [3]. Climate conditions of ash forests area are rather varied that are demonstrated during the seasons coming, in difference of thermal regime, lasting of snow-covering, nature of wetting and in distribution of other climate elements [1].

It usually grows well on deep fertile soft fresh soils, on black degraded soils, dark-grey clay-loam soils, on running wetting soils. It is distinguished by considerable photophily. It imposes heavy demands on moistness, hygrophyte. European ash in a climate of Belarus grows successfully on medium and slightly acid soils within the interval at pH of salt extract from 5.0 to 6.1 and water extract from 5.5 to 7.0. The best growth of trees is observed on slightly acid soils at pH of salt extract 5.1–5.6 and water extract 6.0–6.3 [1, 3].

**Main part.** Research of N.D. Yurkevich and V.S. Aderikho show that in spite of rather big photophily and natural regeneration young trees of European ash can survive and grow fairly good during the first years only under the shelter of comparatively dense stand (at forest density of 0.7–0.9), but in future it forms timber admitted weight in case of sufficient amount of light. [1].

Ash is very often reproduced by separated forest stand (in overstory gaps) and it forms resistible

biogroups understory and its root system, well developed in upper layer of soil, uses well fertility of forest soil. All these qualities provide ash with longer capacity for survival under the shelter of other species and strengthen its positions in phytocenosis [1].

Research carried out earlier by I.D. Yurkevich, V.S. Aderikho, V.S. Heltman, and V.S. Ivkovich testifies about native born biology of ash trees in a climate of Belarus. Based on the research findings it has been revealed that European ash grows naturally and forms high-productive standing wood complicated by texture and mixing in composition in wood-sorrel family, aise-weed, nettle family and other series of forest types [1, 4, 5, 6].

Natural areal of European ash provides its centuries-long usage in business purposes. As a result, at present ash forests occupy non-considerable areas of the forest fund of the Republic of Belarus [1, 7].

Heavy usage of all the forests of the Republic of Belarus including ash forests lead to the decrease of area of ash forests, its compositional disorder, reserves and age structure.

Research has been carried out on conditions of ash forests, since the post-war period (forest fund estimation of 1959). Data of the forest fund estimation for a 55-year-period since 1956 till nowadays have been used.

It should be noted that in accordance with estimations carried out in 1956 ash forests were outspreaded on the area of 5.6 thousand/ha, that made 0.09% of forest covering area in the Republic of Belarus with reserve of 0.48 mln. m<sup>3</sup>. For a 55-year-period the area of ash forests increased 5.5 times and made in 2006 30.9 thousand ha, that corresponds to 0,45% of forest covering area (table 1, figure).

It has been established, that middle-aged ash stand predominates in the republic. Their area increased from 1.4 thousand ha (1956) to 20.1 thousand ha (2006). Young stands (in total I and II age classes) in 1956 occupied area of 3.3 thousand ha, that made 58.9% of all ash forests.

Table 1

**Classification of ash forests on age groups in the Republic of Belarus, thousand ha/%**

Year of registration	Total	Young forests		Total young forests	Middle-aged	Ripening	Mature	Per cent out of forest covering area
		age class I	age class II					
1956	5.6	2.7 / 48.2	0.6 / 10.7	3.3 / 58.9	1.4 / 25.0	0.5 / 8.9	0.4 / 7.2	0.09
1961	6.3	3.4 / 54.0	1.0 / 15.9	4.4 / 69.8	1.1 / 17.5	0.4 / 6.4	0.4 / 6.3	0.14
1966	10.0	6.4 / 64.0	1.6 / 16.0	8.0 / 80.0	1.2 / 12.0	0.6 / 6.0	0.2 / 2.0	0.21
1973	10.6	5.3 / 50.0	3.0 / 28.3	8.3 / 78.1	1.6 / 15.1	0.4 / 3.8	0.3 / 2.8	0.20
1978	12.3	4.5 / 36.6	5.1 / 41.5	9.6 / 78.1	2.3 / 18.7	0.4 / 3.2	—	0.21
1983	14.6	3.8 / 26.0	6.6 / 45.2	10.4 / 71.2	3.7 / 25.3	0.4 / 2.8	0.1 / 0.7	0.23
1988	16.9	3.1 / 18.3	8.0 / 47.3	11.1 / 65.8	5.3 / 31.4	0.4 / 2.4	0.1 / 0.6	0.28
1994	22.7	3.5 / 15.5	5.0 / 28.6	10.0 / 44.1	11.3 / 49.8	1.8 / 3.5	0.6 / 2.6	0.31
2001	28.5	3.2 / 11.2	5.9 / 20.1	9.1 / 31.9	17.6 / 61.8	1.2 / 4.2	0.6 / 2.1	0.36
2006	30.9	2.8 / 9.1	5.9 / 19.1	8.7 / 28.2	20.1 / 65.0	1.1 / 3.6	1.0 / 3.2	0.45
2011	27.3	2.4 / 8.8	4.4 / 16.1	6.8 / 16.1	17.8 / 65.2	1.7 / 6.2	1.0 / 3.7	0.39

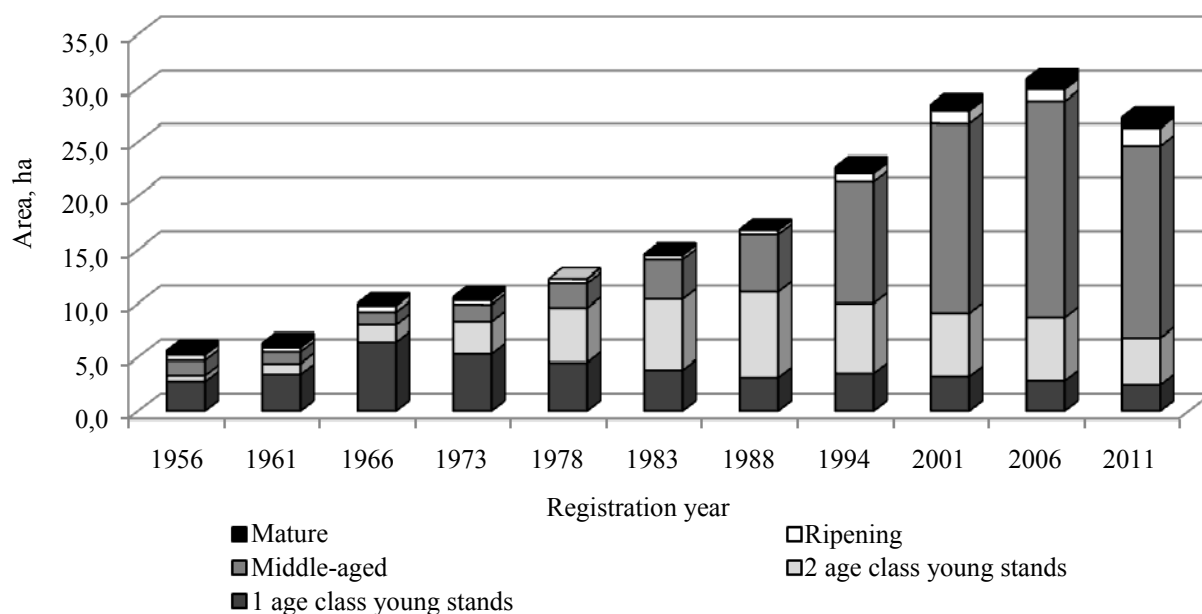
During the war and first post-war years intensive exploitation of all forests on the territory of Belarus was observed. In total area of forests and forest covering area decreased. In connection with this, lots of forest cultivation work was carried out during this period. Regeneration of cutover stands as well as orphan lands was carried out, that had the form of farm woodlots, developed peatlands, gravel and chalk pits and etc. All these measures increased the area of young forest and up to 1988 young stand predominated and made from 58 to 80% of ash forests. Ripening and mature stand are represented in a small number.

If a nominal number of ripening ash forest stand increases from 0.4 to 1.7 thousand ha, then a number of ash forests decreases from 8.9 to 6.2%. In some registration years (1961, 1973, 1978, 1983, 1988) their areas made only 0,4 thousand ha

or from 6.4% in 1966 to 2.4% in 1988 of ash forests. Since 1994 slight increase of ripening forests area has been observed from 0.8 thousand ha in 1994 to 1.7 thousand ha in 2011. (table 1). Mature forests occupies area from 0.1 to 1.0 thousand ha, that made in different registration years from 7.2% in 1956 to 0.6% in 1988.

Judging by the dynamics of ash forests areas changings since 1956 from young stands of the I class, that at that time occupied 2,7 thousand ha (3.4 thousand ha in 1961), to ripening in 2011, area-wastage equals to 3.5 thousand ha took place.

Young stands of the II aged class in 1956 and 1962 occupied areas of 1.6 thousand ha, and in 2011 they reached maturity and occupy 1,0 thousand ha of ash forests. Wastages in the process of growing made 0.6 thousand ha.



Dynamics of classification of ash forests on age groups in the Republic of Belarus

Table 2

**Classification of ash stands on age groups in other users forests, thousand ha**

Year of registration	Total	Young stands		Total young stands	Middle-aged	Ripening	Mature
		Class I	Class II				
2001	4.1	0.4	1.1	1.5	1.7	0.5	0.4
2006	3.9	0.2	0.9	1.1	1.9	0.3	0.6
2011	4.5	0.1	0.6	0.7	2.5	0.6	0.7

Other organizations have exploited in different registration years from 3.9 to 4.5 thousand ha of ash forests, that makes 27.3–35.3% of these forests, mature – 0.4–0.7 thousand ha, that makes from 60 to 70% of this category of forests (table 2).

During the last 15 years there is a tendency of decreasing of young stands area in ash forests. Thus, area of I and II aged classes young stands decreased from 10.0 thousand ha in 1994 to 6.8 thousand ha in 2011. During the last 5 years areas of middle-aged stands have also decreased - from 20.1 to 17.8 thousand ha.

**Conclusion.** Some research connect general decrease of areas of ash forests with their mass drying that arises by different kinds of pathogenic fungi [8, 9]. But, apparently, this decrease may be connected with other factors as well. First of all, with improvement cutting in ash forests at early stage of their formation, when due to inadequate maintenance, ash forests transforms into other forest formations, mainly soft-wooded broadleaved species. Biological peculiarities of timber species of European ash are also of no small importance. Its fast growth, confinedness to wet conditions of the site makes certain impact on biopersistence of the species.

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