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RATING ASSESSMENT OF THE ENVIRONMENTAL AND ECONOMIC COMPOSITIONS OF FOREST STANDS ON THE STAGE "CUTTING – FOREST RENEWAL"

The article deals with impact of cuttings on the composition structure of forest stands. The biological composition is represented as a species structure and origin of the stand, undergrowth, forest habitat functions. The economic composition is complemented economic efficiency and rotation periods. The proposed list of indicators rating estimation. Indicators are quantitative expression in points ($0 \leq 2$). A rating estimation to be mature stands before cutting and cutting result and regeneration.

The Technique of rating estimation approved by the results of cutting on experimental sites (total of 10) of the Department of Forestry. Executed it possible to reveal element wise assessment results cutting and forest renewal. Established objectivity planned and executed cutting the ways and renewal. Analysis of assessment results show big variations in integrated rating. For example, for a given sample of 10 plants rating stands before cutting varies from 5 to 9 points. Rating results cutting and forest renewal varies from 4 to 10 points. Change the rating stands under the influence of cutting fixed with its decline (up to 3), unchanged (0) and higher ($\geq 1 \leq 4$). The technique is an objective basis for the selection of effective forest management decisions at the stage of "cutting – forest renewal".

Key words: cutting and forest renewal, technique of an estimation, the compositions of stands, the impact of cutting on the planting, the rationale for the method and forest renewal.

Introduction. Cutting of main has a very extreme effects on the structure of forest stands. The removal of the parent stand and subsequent stand regeneration of the young generation may lead to changes in its composition. In turn, the composition of the forest can radically change the appearance of the forest ecosystem as a whole. The biological component of forest stands varies, mainly in parts of the species structure of the forest stand, undergrowth and herb-dwarf shrub layer. This causes a change in intra- and interspecific interactions that affect the stability of the stands. Logging as a form of economic activity also influences the economic component of forest stands. The method of cutting and associated method define reforestation technology of harvesting and reforestation works, affecting the economic efficiency (profitability) of felling and reforestation. An important result of the variety of ways of cutting and resume is its effect on the rotation period. In order to evaluate the influence of final felling on environmental-economic component of the planting objectively the method of rating evaluation plan (or completed) logging and forest renewal is proposed.

Main part. The rating of the stands before the main felling is done on the basis of 5 indicators: structure of the forest, origin of forest, reserve forest, the undergrowth, the environmental function of the forest. The rating of the result of logging is set on the basis of 5 indices: the environmental function of forests at the stage of "cutting – renewal of the forest", the composition of the future forest stand, the origin of the future forest stand, economic efficiency of logging and forest regeneration, felling cycle. The maximum assessment rate is 2 points, minimum – 0 points. The maximum rating of mature stands is 10 points. The content and rating indicators are shown in Table 1. The possibility of applying the proposed methodology was tested on the results of cuttings on the experience permanent plots of the Department of forestry. The description of experience permanent plots No. 1–7 is given in the article [1], rating – in Table 2.

Permanent plot No. 8 – cutting of renewal by two methods. After the first start of cuttings trustworthy undergrowth in the amount of 1,500 PCs./ha remained. The promotion of natural regeneration through creation of mineralized strips was conducted. Currently a rapid emergence of seedlings with a predominance of pine and spruce is observed on the mineralized elements.

Permanent plots No. 9, 10 – stripe-gradual cutting. The undergrowth is represented by pine, spruce and birch in natural conditions and uniform placement. On the first stripe activities to promote natural regeneration were conducted, the mineralized zone was created. The quantity of undergrowth was 18,800 PCs./ha. On the second stripe the renewal was unsatisfactory. For this reason, the forest cultures were established here.

The proposed method of rating assessment allows to identify by item results of felling and renewal, to assess the objectivity of the planned and executed methods of felling and regeneration. The analysis shows a significant variation of the magnitude of the rating. For example, for the sample of 10 plantings (permanent plots) rank plantations before the felling varies from 5 to 9 points (maximum of 10 points is not revealed). The rating of results of logging and forest regeneration varies from 4 to 10 points, the rating change is recorded with a decrease (–3), no change (0) and increasing (from +1 to +4).

Table 1

The content of the rated criteria phase "cutting – renewal of the forest"

Name of assessment indicators	The rating of indicator scores	
1. A ripe planting before felling		
1.1. Composition of the forests	Corresponds to native forest type	**2**
	Partially corresponds to native forest type	**1**
	Does not correspond to native forest type	**0**
1.2. Origin of the forests	Seed	**2**
	Seed and vegetative	**1**
	Vegetative	**0**
1.3. Store of the forests	In the proportion ≥ 0.8 of potential	**2**
	In the proportion ≥ 0.6 < 0.8 of potential	**1**
	In the proportion < 0.6 of potential	**0**
1.4. Undergrowth	Major species in sufficient quantity	**2**
	Major species in insufficient quantity	**1**
	Missing or of minor tree species	**0**
1.5. Environmental function of forests	Environmental completeness ≥ 0.6	**2**
	Environmental completeness ≥ 0.3 < 0.6	**1**
	Environmental completeness < 0.3	**0**
2. Results of felling and renewwal		
2.1. Environmental function of forests at the stage of "cutting renewal"	Environmental completeness ≥ 0.6	**2**
	Environmental completeness ≥ 0.3 < 0.6	**1**
	Environmental completeness < 0.3	**0**
2.2. Composition of the future forests	Corresponds to the native forest typy	**2**
	Partially corresponds to the native forest type	**1**
	Does not correspond to the native forest type	**0**
2.3. Origin of the future forests	Seed	**2**
	Seed and vegetative	**1**
	Vegetative	**0**
2.4. Economic efficiency of logging and forest regeneration	Profitability of logging and renewal ≥ 50%	**2**
	Profitability of logging and renewal ≥ 14 < 50%	**1**
	Profitability of logging and renewal < 14%	**0**
2.5. Logging rotation	Reduction of rotation period ≥ 10 years	**2**
	Reduction of rotation period ≥ 2 < 10 years	**1**
	Reduction of rotation period ≤ 1 year	**0**

Table 2

The rating of plantings of pilot permanent plots before the felling and according to the results of logging and regeneration of the forest

Names of permanent plots	Integrated rating		Change of rating (+, –)
	Planting before felling	Result of cutting and renewal	
1. 3-foster gradual cutting	8	9	+1
2. 2-foster gradual cutting	9	9	0
3. 2-foster gradual cutting	8	9	+1
4. 4-foster gradual cutting	7	8	+1
5. 2-foster gradual cutting	7	10	+3
6. Prolonged-gradual felling	5	9	+4
7. Clear-cutting with preservation of undergrowth and timber	5	9	+4
8. 2-foster gradual cutting (renewal cutting)	8	8	0
9. Strip-gradual cutting with preservation of undergrowth and natural renewal	7	7	0
10. Strip-gradual cutting with measures to promote and establishment of forest cultures	7	4	–3

Conclusion. Methods of the main felling and reforestation have a significant impact on ecological and economic component of plantations, including their biological, economic and ecosystem components in the whole.

The developed technique of a rating estimation of ecological and economic components of plantations is an objective basis for the selection of effective forest management decisions at the stage of "cutting – renewal of the forest" that defines the future of forest plantations.

References

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