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SELECTION OF EUROPEAN LARCH FOR SEED PRODUCTIVITY

The values characterizing size and quality parameters of raw materials of European larch forest seed and sowing properties of seeds. It is noted that in the procurement of European larch cones should be taken into account that in the same tree may be cones like last year and the current one. Seeds from last year's cones do not germinate, so they can not collect. The main feature of the cones of this year from last year is a shade of color scales. Last year's cones are tarnished brown color, and the current – light brown. Furthermore, in the last year cone scales usually bent more than the cone of the year. There exist forms of European larch cones with sprouted shoots, but significant differences between them and conventional forms of cones are not revealed. Scientific interest for further research are cones with late ripening. Studies have shown that the seeds of which have a higher germination, they are significantly wider than usual, but the seeds germinate later by an average of 5 days. When conducting selection of European larch seed production need to select trees with large cones. Lined reliably, that the longer the cones, the more seeds contained therein, the greater the number of falls during the drying cone and the greater the weight of 1,000 seeds.

Key words: European larch, selection, properties sowing, harvesting cones, individual selection.

Introduction. One of the most effective ways to improve the productivity of forests of Belarus and enhance their quality is the introduction to the culture of commercially valuable fast growing timber species.

First of all such species should include European larch. It is believed that it had previously naturally grown on the territory of modern Belarus, after which the area has been shifted to the mountainous part of central Europe [1].

Now most of the seed of European larch is purchased abroad, but at the same time, the Ministry of Forestry of the country is actively working to accumulate its own permanent European larch forest-seed establishment o meet the needs of enterprises in the seed of the species.

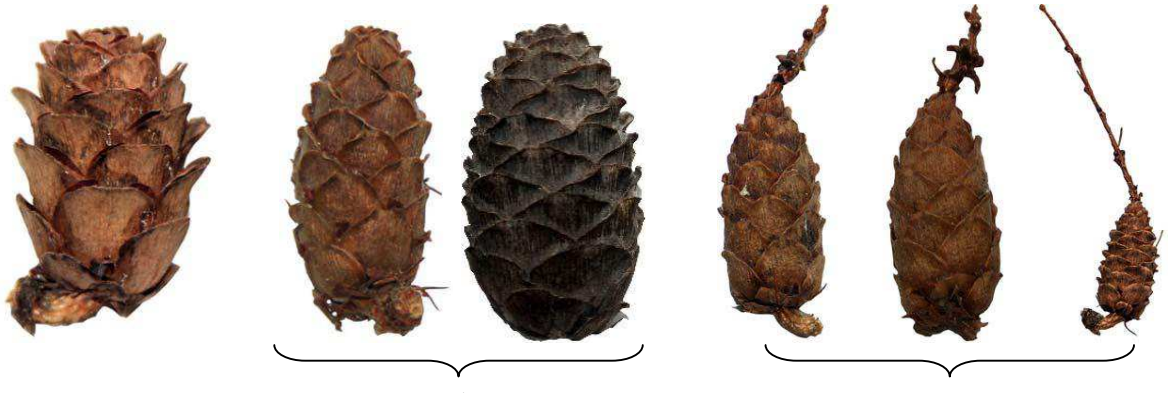
Thus, by 2014 forest-seed plantations were established on an area of over 37 hectares, of which 2.5 hectares are certified. Many of the created objects have already reached the age of fruiting, so they have not only practical, but also scientific interest for the procurement of local seed reproduction.

Main part. Cones of European larch ripen in late summer – early autumn, and continue for several years their hanging on a tree [2].

This biological feature should be taken into consideration when collecting forest seed raw material of European larch. Erroneous blank of last year's cones can significantly reduce the quality of the collected material.

To confirm this, we investigated located on the same tree last year cones as well as current ones. In our opinion, the main feature of this year cones from last year ones is a shade of color scales.

Last year's cones are tarnished brown in color, and this year ones are light brown. Moreover, scales of the last year cones are usually bent more than the scales of the current year (Figure *a* and *b*).



a *b* *c*

The cones of European larch:
a – of the last year; *b* – of the current year; *c* – germinated

Comparative analysis of the current and last year's forest seed materials

Index	Variant		Student's criteria
	Last year cones	Current year cones	
Collective cultures			
Cone weight, g	1.49 ± 0.23	2.58 ± 0.22	3.42
Cone length, mm	25.90 ± 1.95	31.80 ± 0.90	2.75
Cone width, mm	16.20 ± 0.64	17.50 ± 0.61	1.47
Seed lenth, mm	4.10 ± 0.35	4.30 ± 0.08	0.56
Seed width, mm	2.60 ± 0.23	2.60 ± 0.05	0.00
Amount of seeds in the cone, pieces	37.00 ± 5.90	54.00 ± 2.45	2.66
Mass of 1,000 seeds, g	5.44 ± 0.74	5.20 ± 0.24	0.31
Cones seeds yield, %	13.30 ± 0.80	11.40 ± 0.65	1.84
Amount os seeds dropped out of the cones during drying, %	47.00 ± 7.59	34.00 ± 6.01	1.34
Germination, %	0	14.40 ± 1.60	–
Germinative energy, %	0	3.60 ± 0.95	–
Average seed quiescence, days	0	11.80 ± 0.52	–
Seed plantation			
Cone weight, g	2.71 ± 0.35	2.10 ± 0.26	1.40
Cone length, mm	33.40 ± 18.38	29.70 ± 1.63	0.20
Cone width, mm	18.40 ± 0.42	16.40 ± 0.72	2.40
Seed lenth, mm	4.30 ± 0.10	4.20 ± 0.11	0.67
Seed width, mm	2.60 ± 0.08	2.50 ± 0.04	1.12
Amount of seeds in the cone, pieces	40.00 ± 11.59	45.00 ± 6.51	0.38
Mass 1,000 of seeds, g	5.49 ± 0.36	4.59 ± 0.38	1.72
Cones seeds yield, %	7.90 ± 1.96	9.80 ± 1.28	0.81
Amount os seeds dropped out of the cones during drying, %	51.60 ± 17.06	32.60 ± 8.07	1.01
Germination, %	0	35.60 ± 6.97	–
Germinative energy, %	0	31.40 ± 6.70	–
Average seed quiescence, days	0	6.40 ± 0.30	–

Note. Conventional true value of Student's criteria $t = 2.03$.

Comparative analysis of the cones harvested last year's and the cones of the current year workpiece are shown in the table. Variouos material from different areas was used for the analysis (from a collective cultures of European larch as well as from seed orchards of generative origin).

Analysis of the data showed that the seeds from last year's cones do not germinate. Therefore, they can not be collected with the current year cones. The Table also shows that most of the other parameters have not significant differences. However, the last year collection cultures cones were heavier and longer, but at the same time they contain fewer seeds, as some of them falls.

In seed orchards these indicators are not so evident, but last year's cones are characterized by a high rate of width. This can be explained by the fact that the cones eventually become wider due solved scales.

Some morphological forms of European larch cones were determined in the process of carring out researches. Thus, cones that were not yet fully lignified (late-ripening) were harvested in the collection (Figure *b*). Also germinated cones were selected (Figure *c*).

Their comparative analysis showed that late-ripening cones forms of European larch on the majority of the analyzed parameters did not differ from the usual form. Significant differences were observed for the width of the cones (late-ripening form was wider than normal), seed yield of cones in her less, but laboratory germination is much higher, and the average seminal peace appeared longer.

With regard to the comparative analysis of the parameters of conventional and sprouted buds, the significant differences between them have not been found.

The next stage of research was to identify the relationship between the various European larch forest seed materials.

The calculations of the correlation coefficient with the follow-conductive determining of its authenticity was performed to do this.

This work allows revealing the morphological characteristics, which can be carried out to realize the individual selection of trees.

It should be noted that, however, this relationship we were not able to identify when performing these calculations, the greatest interest is the correlation between morphological characteristics and properties of sowing seeds.

Very high value of the coefficient of correlation found between germination energy and germination of seeds, but this relationship is more obvious and points to the fact that the majority are able to germinate seeds in European larch germinate in the first ten days.

The same pattern is confirmed by the significant value of the correlation coefficient with the "–" sign between the germination of seeds and average seed dormancy.

Also it was found that the mass of 1,000 seeds is significantly correlated with a number of parameters such as the length of cones, cones width, weight of cones.

Thus, one can argue that conducting individual selection of plants with large cones may conduct selection for a seed with a greater mass of 1,000 seeds.

We have repeatedly drawn attention to the problem of extracting seeds from cones [3, 4]. Analysis calculated correlation coefficient values showed that the more seeds are in the cones of, the greater the number of seeds drops during drying.

The relationship is weak (correlation coefficient is 0.4), but reliable at the confidence level of 0.95. The amount of seed in the cone, in turn, is significantly correlated with the size of the cones – length, width and weight.

Conclusion. The researches allow us to make the draw the following conclusions:

– harvesting European larch cones should be noted that last year cones as well as the current year cones can be situated on the same tree.

Last year cones seeds do not germinate, so they can not be harvested. The main feature of the current year cones from the last year cones is a shade color of scales.

Last year cones are tarnished brown in color, and current year ones are light brown. Moreover, scales of the last year cone are usually bent more than of the current year cones.

The best way of cones harvesting is dry and sunny weather, a few days after rainfall;

– some of cones of European larch are germinated, any significant differences between them and the ordinary forms of the cones have not been identified.

Late-ripening cones of European larch have scientific interest for further research. Reserches have shown that the Late-ripening cones seeds have a higher germination, they are significantly wider than normal, but later grow by an average of 5 days;

– one of the most important factors to be considered in the process of European larch selection is the size of cones, namely their length.

It is evident that the more the length of cones is, the more seeds it contains, the greater seeds number falls out of the cones during drying and the higher the weight of 1,000 seeds is.

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