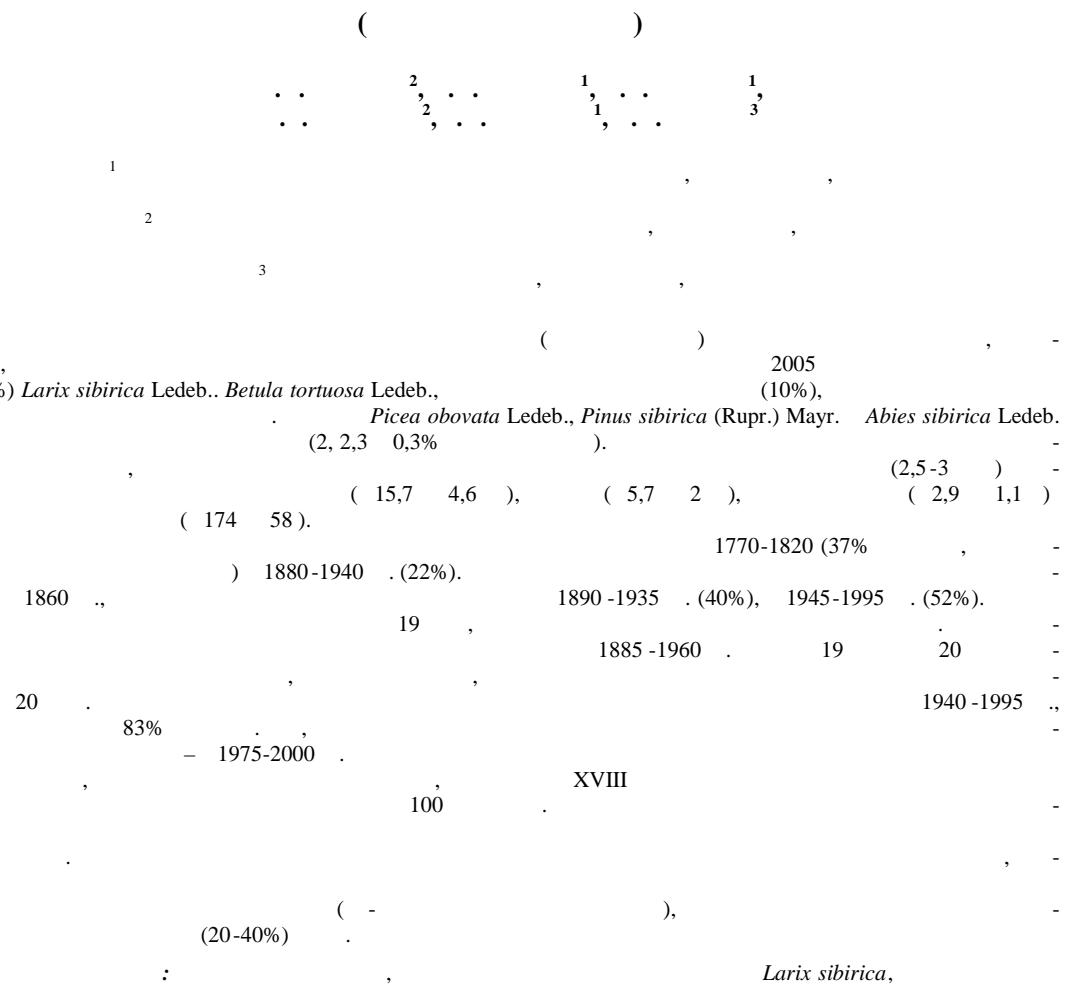


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Differences in the composition, structure, altitudinal position of stands and characteristics of the mast 2005 year cones and seeds of dominated (85%) here *Larix sibirica* Ledeb. were studied at the subgoltzy belt in the Serebryanskii Kamen' (the North Urals). *Betula tortuosa* Ledeb., second by domination (10%), grows mainly in low and middle part of belt. Participation of *Picea obovata* Ledeb., *Pinus sibirica* (Rupr.) Mayr. and *Abies sibirica* Ledeb. in stands formation is insignificant (2, 2.3, 0.3% accordingly). By analysis of stands features it were marked, that from low to high part of the belt there are significant decreasing of larches diameters on breast height (from 15.7 to 4.6 cm), heights (from 5.7 to 2.0 m), crown diameters (from 2.9 to 1.1 m) and ages (from 174 to 58).

In low part of the belt intensive larches establishment were in 1770-1815 (37% of trees growing in present) 1880-1940 yrs (22%). The birches oldest trunks appearance were dated by beginning of 1860 yrs here. However, mass establishment of birch were in 1895-1935 . (40%) and 1945-1995 yrs (52%). Stone pine and spruce started to occupy this part of belt since the beginning of 19 century, but their share in composition is still very low. In the middle part of the belt larches establishment were in 1885-1960 yrs. In the end of 19th and the beginning of 20th centuries spruce, stone pine and birch started to occupy this part, but this process became especially intensive since the middle of 20th century. In the high part of the belt larches establishment were in 1940-1995 yrs, when appeared 83% of trees. Spruce, stone pine and birch appeared here latter and simultaneously in 1975-2000 yrs.

On the whole, the results of our studies show that the treeline shifted upward on about 100 m of altitude since the end of 18th century. Among a fairly large number of tree species growing in the subgoltzy belt, the birch incorporated most actively in the last century in structure of the larch stands situated in the low part of the belt. These changes are explained by climate warming and increasing humidity in the last century, which improve condition for regeneration and survival of the birches stems and deteriorate condition for larch sapling survival (due to greater snow accumulation), in spite of quite high germination capacity of larch seeds (20-40%) here.

Key words: stands structure, size and seeds number of *Larix sibirica* cones, mountain treeline, climate changes, North Urals

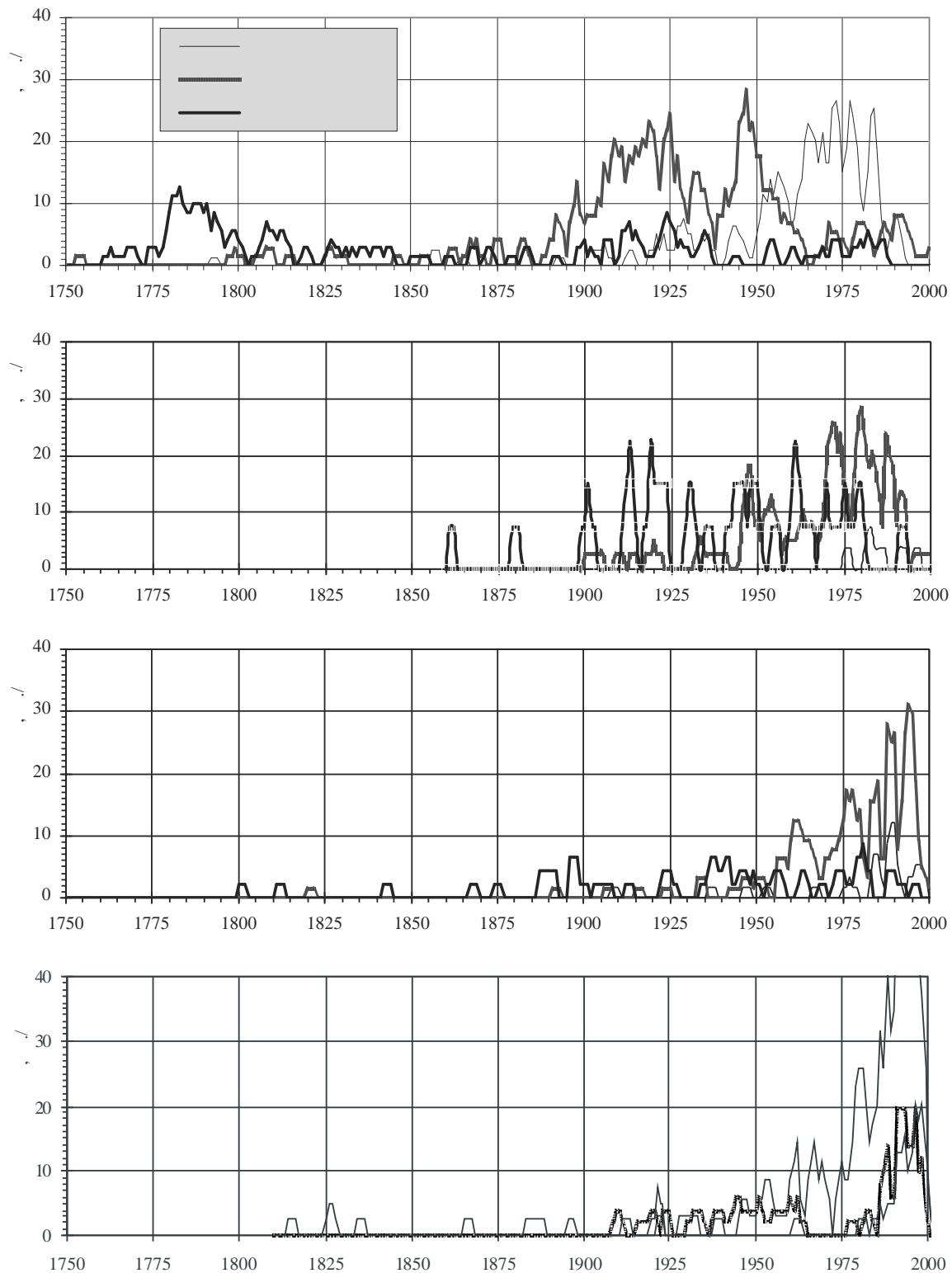
¹ See, for example, the discussion of the 'right to be forgotten' in the European Union's General Data Protection Regulation (GDPR), Article 17(1).

1 -

| | | | | 1,3 | |
|------|------|------|-----|------|-----|
| 96 | 1 | 2 | 0 | 0 | 100 |
| 88 | 0 | 1 | 0 | 11 | 100 |
| 71 | 5 | 4 | 1 | 19 | 100 |
| 85,3 | 2,0 | 2,3 | 0,3 | 10,0 | 100 |
| 90 | 90 | 92 | 47 | 82 | 88 |
| | | | | | |
| 49 | 8 | 39 | 1 | 4 | 100 |
| 45 | 11 | 6 | 7 | 32 | 100 |
| 26 | 14 | 8 | 19 | 33 | 100 |
| 40,5 | 11,0 | 17,0 | 8,5 | 23,0 | 100 |
| 81 | 91 | 94 | 66 | 83 | 84 |

2 -

| | | | | | |
|--|--|--|----------|----------|----------|
| | | | 905 | 950 | 1005 |
| | | | 20,4±0,6 | 9,6±0,2 | 6,7±0,2 |
| | | | 62,1 | 31,6 | 23,0 |
| | | | 15,7±0,5 | 7,4±0,2 | 4,6±0,2 |
| | | | 44,6 | 21,5 | 21,7 |
| | | | 5,7±0,2 | 3,0±0,1 | 2,0±0,1 |
| | | | 12,5 | 8,5 | 6,0 |
| | | | 174±5 | 93±2 | 58±2 |
| | | | 331 | 345 | 211 |
| | | | 1,4±0,06 | 0,7±0,02 | 0,3±0,01 |
| | | | 2,9±0,09 | 1,7±0,05 | 1,1±0,04 |
| | | | 8,6 | 7,0 | 5,9 |
| | | | 741 | 1514 | 868 |
| | | | 5694 | 4956 | 1506 |
| | | | 16,2 | 15,6 | 3,5 |
| | | | 18,2 | 15,9 | 12,5 |
| | | | 65,6 | 68,5 | 83,9 |
| | | | 2/ | | |



| | | | | | |
|---|------------|---|--------------|-------------|--------------|
| 18-19 | (. . 1). | - | (87%) | 1946-1993 | (. 1). |
| 1783) | 40% | - | - | 1950 .. | 1941-1992 .. |
| 1763 1845 (48%). | - | - | 2000 .. | - | 1975 .. |
| 1774-1815 (37%) | - | - | - | - | - |
|) 1881-1937 (22%). | - | - | - | - | - |
| (. 1). | - | - | - | - | - |
| 1898-1936 (40%), 1946-1993 (52%) (. 1). | 19 | , | 1,9-2,5 | (. 3). | , |
| (. 1). | - | - | (4,0) | (1,0-1,2), | , |
| 1960 (. 1), | - | - | 1886 - | 1-1,5 | , |
| 1927 .. 19 | - | - | 1925 - | 3,0-3,5 | , |
| 20 (. 1). | - | - | 1936-1940 .. | 1,0-4,0 | , |
| 20 (. 1) | - | - | - | - | - |
| 20 1980-2000 .. | - | - | - | 2,2-2,4 .. | - |
| 1980 .. | - | - | - | 1,9-2,1 .. | - |

3 -

| | 1005 | 950 | 905 | 1030 | 980 | 950 | 1030 | 960 | 920 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 2,15 | 2,41 | 2,45 | 1,93 | 2,39 | 2,40 | 2,08 | 2,28 | 2,22 |
| | ±0,02 | ±0,02 | ±0,02 | ±0,02 | ±0,02 | ±0,02 | ±0,01 | ±0,02 | ±0,02 |
| | 1,59 | 1,78 | 1,99 | 1,45 | 1,84 | 1,93 | 1,93 | 1,80 | 1,71 |
| | ±0,01 | ±0,01 | ±0,02 | ±0,01 | ±0,01 | ±0,01 | ±0,01 | ±0,01 | ±0,02 |
| | 1,24 | 1,69 | 1,79 | 0,95 | 1,80 | 1,65 | 1,18 | 1,56 | 1,47 |
| | ±0,02 | ±0,02 | ±0,04 | ±0,02 | ±0,02 | ±0,02 | ±0,02 | ±0,02 | ±0,03 |
| | 23,4 | 36,8 | 44,0 | 12,0 | 30,6 | 29,0 | 24,1 | 26,5 | 25,1 |
| | ±2,2 | ±2,10 | ±2,15 | ±1,25 | ±1,88 | ±1,81 | ±1,93 | ±1,9 | ±1,36 |
| | 0,14 | 0,29 | 0,36 | 0,07 | 0,24 | 0,24 | 0,16 | 0,22 | 0,20 |
| | ±0,01 | ±0,02 | ±0,02 | ±0,01 | ±0,02 | ±0,02 | ±0,01 | ±0,02 | ±0,02 |
| 1000 | 6,2 | 7,8 | 8,1 | 5,7 | 7,9 | 8,3 | 6,3 | 8,4 | 8,2 |
| , % | 4,9 | 41,8 | 36,4 | 2,0 | 21,7 | 36,5 | 26,8 | 42,7 | 42,0 |
| , % | 2,1 | 17,2 | 18,8 | 0,5 | 7,4 | 13,6 | 14,5 | 22,3 | 25,2 |
| | 504 | 503 | 251 | 481 | 663 | 491 | 537 | 522 | 466 |

$$(\quad \cdot \quad 3.). \quad (\quad \quad \quad 2,5 \quad) \quad (\quad \quad \quad 2-2,5 \quad) - 27 \quad 40 \quad ,$$

