

Patterns of dispersion and adaptations of large coniferous woody species in treeline ecotone of the limestone area of the Greater Caucasus (within the border of Samegrelo, West Georgia)

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Field investigation was carried out mainly during the 2010s. I studied the treeline ecotone in the Greater Caucasus Range (GCR), limestone area of Samegrelo district, Okhachkue site (West Georgia, 2000-2300 m a.s.l.).

The present paper focuses to analyses pattern of *Picea orientalis* and *Abies nordmanniana* across subalpine/alpine treeline ecotone.

It should be emphasized that no study of a such kind has into treeline areas from the viewpoint of climatic and orographic influences and their possible-growth relationship.

Via harsh climate of the „alpine tundra” can be explained by the plastic behavior of tree species throughout higher altitudes (Dai 2010).

The woody vegetation of the upper ecotonal zone (treeline) is sensitive to harsh climate mostly attracting to the pattern of growth limiting known as dwarfism. Mature coniferous (spruce and fir) trees in Okhachkue limestone area reach about 1.5-6 m in height.

On the example of treeline ecotone of the Okhachkue site *P. orientalis* functions generally as an important keystone coniferous tree species and may shown a wide range of spatial structures.

Unlike yew tree growing in the treeline ecotone of the limestone area of the GCR (Khvamli limestone massif) which exhibited mat like stand (Gegechkori 2018), dwarf life form of Oriental spruce within the same ecotone has been usually converted to low-density population. This tree creating its own microhabitat.

Manifestation of key adaptation strategies of the spruce is display by the develop of densely branched tree, among of which lower branches touching the ground, obviously distinct from that of the neighbouring timberline populations. Therefore, the tree with its stature is represented by perfect-pyramid shape, providing free from a heavy load of snow layer along lasting cold period (with a clearly expressed snow stress gradient). Patterns of dwarfism, long-distance dispersal, pyramid-shaped architecture in Okhachkue site indicating Oriental spruce’s dispersal ability in high mountain in the Holocene time and selective advantage of alpine/subalpine environment.

Regarding the reproduction strategy, clonal populations of *P. orientalis* obviously prevail in treeline ecotone against seed-based regeneration of native spruce tree in the timberline ecotone.

In contrast of Oriental spruce, *Abies nordmanniana* timberline contributes to the development large and compact fir stands, some individuals of which grow as emergent ones (30-35m in height).

Field data in subalpine/alpine zones, indicate that Caucasian fir can not survives competition from Oriental spruce, therefore fir trees may form shrubby growth forms although keeps upright trunk significantly individuals which growing in different ecological niche, for example, funnel-shaped hollows of karst landforms.

References

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