TRANSFORMATION OF THE PLANT COMMUNITIES OF A TUNDRA

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Abstract
The change of different ecosystem's component and their properties are result of mastering of gas-layers on the north of Western Siberia. In this situation the basic load falls on a vegetative. One of the most indicative is the variation of vegetative communities' composition in tundra. The results of analysis of geobotanical descriptions that used method of Terentiev indicated major factors determining composition of vegetation and modern processes that going in tundra ecosystems. It was determined 20 correlation pleiades that characterize geographic centers of flora forming or connected with features of ecosystem. Now, as the studies have shown, conservation of representative phytocenosises with active involvement of hypoarctic Siberian and Eurasian species is characteristic for territory of Urengoy tundra. The species composition of vegetative communities lower to 2-5 species, the overground altitude of plants is moderated, the horizontal pattern of vegetative communities is changing. At mining and construction of gas-layers there is an advance of boreal vegetation on north and gradual displacement lichens by grassy species. At further increase of mechanical stress on tundra ecosystems, there can be decrease of a specific variety of poor phytocenosises and decrease of stability of northern ecosystems to technogenic load.

Introduction

The many articles are devoted to influencing of the man on plant's communities natural ecosystem at development of Far North territories (1-4). The main part of such studies concerns a problem of recovery of tundra vegetation on a place erased earlier as a result of anthropogenic failures of soil and plants. For north of Western Siberia such studies have got the special value in connection with mining both exploitation of gaseous and gas condensate fields, a consequent that is both utter annihilation of vegetation in vast territories, and variation of specific composition of phytocenosises. It is known, that failure of specific composition, the patterns and productivity of vegetative communities, decrease of their specific variety result in loss by a vegetative of its basic functions, result that is the degradation of whole ecosystems. For an estimation of variations, going in ecosystems, it is necessary to esteem transformation of phytocenosises at two levels - territorial, which one allows to trace variations of dimensional pattern of communities, abatement of a specific variety, and at a level of concrete communities, where the restructuring of a cenosis, variation of its specific composition, reallocating of an abundance of species is fixed (3). Such studies were held on Samburgskoe, Evo-Jahinskoe and Severo-Urengoiskoe gas condensate fields on plots with a various extent of vegetation disturbance. The considered plots included various types of tundra plant's communities.

The learnt territory is referred to forest-tundra of area and zone of hypoarctic tundra. In natural conditions the basic role in formation of a cenosis is necessary on groupings of representative dwarfishbushes-lichen tundra plants with an impurity of separately costing cedars and larches,

that one on badly drained leases are replaced by bogs. On coasts of the large rivers are posed epy larch' wood, and on apron plains of the small rivers and streams are abundant were over dwarfish birch, various species of willows and meadow communities.
The analysis of the geobotanical specification statements of natural phytocenosises of Urengoy tundra held on a method by Terentiev (5), has shown close intercoupling of plants in various dwellings. On %5-s significance value from communal composition of vegetative pleiades two species of peat moss and one species of cottongrass were carved out only. It is connected to rather homogeneous exterior conditions of Urengoy tundra - flat terrain, sufficient bogginess and watering of soils, homogeneity of geocomplexes. At transferring to more high level of the importance 20 correlation pleiades reflective geographic centers of forming of flora or connected to features of dwellings were dedicated (Fig. 1).

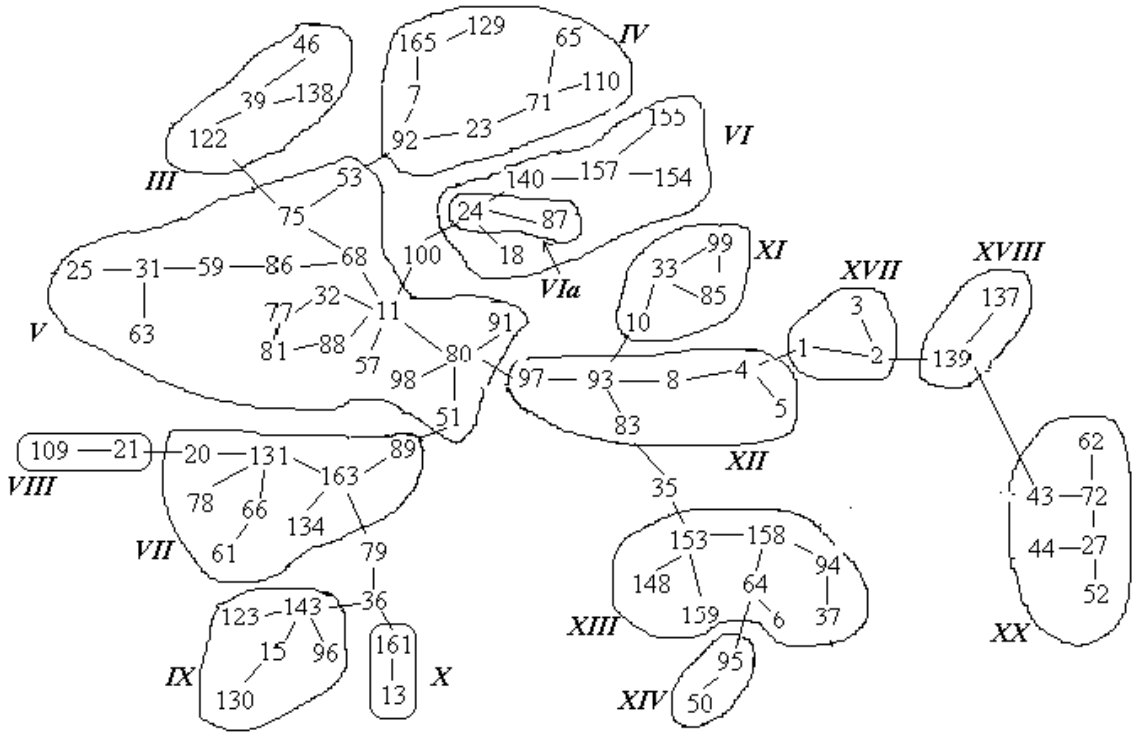

Fig. 1. System of correlation pleiades for plant's communities of Urengoy tundra

14 – number of species, *IX* – number of pleiad

The central place in system of pleiades occupy 3 kinds of phytocenosises. The first of them - the phytocenosis of the Moderately - Arctic plants (Table 1) - pleiad VII. This vegetative community is dated to dry stony tundra on watersheds in conditions of the not disturbed ecosystems. At occurrence of technogenic load and magnification of soil damp from composition of community begin to settle out grassy species, on their place come peat moss. In result the willow-peat cenosises are form - pleiad VIII. Second is community of boreal plants of warm dwellings - pleiad V. Such cenosises are abundant on meadows on apron plains of the rivers on wet and concerning warm grounds. At magnification of watering of grounds fade out meadow plants, in composition of a cenosis there are sedges and peat moss, the meadows succumb are replace by hypnum moss-sedge and sedge-peat bogs - pleiad III and IV accordingly. If the damp of grounds is rather insignificant, but the grounds thus warm enough, meadow communities at

erasion from fluvial apron plains are replaced by willow-lichen cenosises - pleiad VI. Third of the basic specified complexes is the correlation core of Siberian boreal species - pleiad XII, XVII. All plants which are included in this pleiad, grow on the uncontaminated grounds in conditions of nondisturbed or gentle-disturbed ecosystems. This community replaces a cedar on coast plot of the large rivers of district and includes moss of boreal thin forests - pleiad XVIII. Sometimes, on the warm dwellings in composition of these phytocenosises occur Euroasian boreal species - pleiad XI.

Table1. List of Plant species of Urengoy' tundra

№	Plant Names in Latin	№	Plant Names in Latin
1	Betula tortuosa Ledeb.	75	Pedicularis hyperborea Wed.
2	Larix sibirica Ledeb.	77	Pedicularis palustre L.
3	Picea abies (L.)Korst.	78	Pedicularis sp.
4	Pinus sibirica	79	Petasites frigidus (L.) Coss.
5	Sorbus sibirica Hedl.	80	Polygonum viviparum L.
6	Betula nana L.	81	Pyrola rotundifolia L.
7	Betula tundrarum Perf.	83	Rubus arcticus L.
8	Duscheckia frutecosa	85	Senecio nemoralis L.
10	Rosa cinnomomea Herr.	86	Solidago lapponica With.
11	Salix arbuscula L.	87	Stellaria graminea
13	Salix glauca L.	88	Stellaria humifusa Rotfb.
15	Salix hastata L.	89	Stellaria pedunculus Bunge
18	Salix myrsinifolia	91	Tanacetum bipinnatum(L.)Sch.-Bip
20	Salix phylicifolia L.	92	Trichophorum caespitosum (L.)
21	Salix phylicifolia L.x S.myrsinifolia	93	Trientalis europaea L.
23	Salix sp.	94	Vaccinium minus (Lode)Worosch.
24	Salix stipulifera Flod.	95	Vaccinium ssp.microphyllum Lang
25	Salix viminalis L.	96	Vaccinium myrtillus L.
27	Arctophila fulva (Trin.) Anderss.	97	Veratrum lobelianum Bernh.
31	Aster sibiricus L.	98	Viola canina L.
32	Botrychium multifidum Rupr.	99	Viola biflora
33	Cacalia hastata L.	100	Viola sp.
35	Calamagrostis langsdorffii(Link)Tr.	109	Sphagnum lenense
36	Carex arctisibirica (Jatr.) Crev.	110	Sphagnum sp.
37	Carex aquatilis Wahlenb.	122	Calliergon stramineum
39	Carex capitata L.	123	Dicranum angustum Brid.
43	Carex rariflora(Wahlenb).Somth.	129	Gymnocolea inflata (Huds.) Dum.s
44	Carex rostrata L.	130	Hypnum sp.
46	Carex rupestris	131	Lophozia ventricosa (Wees.)Molon
50	Empetrum subholarcticumV.Vasil.	134	Pohlia nutans (Hedw.) Lindb.
51	Equisetum arvense L.	137	Polytrichum commune Hedw.
52	Equisetum fluviatile	139	Polytrichum strictum Brid.

53	Equisetum palustre L.	140	Polytrichum gracile Bryk.
57	Festuca ovina L.	143	Ptilium crsto-castrensis (Hedw)
59	Hieracium umbellatum L.	148	Cetraria cucullata
61	Juncus arcticus Wild.	153	Cladina alpestris (L.)Rubh.
62	Juncus casteneus Sm.	154	Cladonia cenotea (Ach.) Schaer.
63	Juncus filiformis L.	155	Cladonia deformis (L.) Hoffm.
64	Ledum decumbens	157	Cladonia pleurata (Fel.)Schaer.
65	Licopodium alpinum	158	Cladina rangiferina (L.) Web.
66	Lycopodium clavatum L.	159	Cladina sylvatica (L.) Harm.
68	Luzula multiflora (Retz.) Les.	161	Nephroma arcticum (L.) Tuckm.
71	Majanthemum bifolium(L.) FMSch.	163	Peltigera canina
72	Menyanthes trifoliata L.	165	Stereocaulon

With enumerated three basic pleiades intimately connect some phytocenosises: hypoarctic undersized willow tundra - pleiad X; bilberry-moss tundra with willow - pleiad IX; representative dwarfishbushes-lichen tundra of dry microcomplexes - pleiad XIII. Last pleiad frequently includes species of vegetative communities of northern tundra - pleiad XIV.

All these vegetative complexes are present in Urengoy' tundra at natural conditions of environment. However at mining and construction of gas fields there is a failure of vegetation of territory. Major factor causing variations in phytocenosises near to prospecting drill sites is the mechanical affecting conditioned by use of high-gravity caterpillar transport that is the basic type of movement in tundra. The large damage to a vegetation is put during building and construction of wells. At well boring in territory of a drill site the plenty of service water contaminated with various chemical reagents, clay and lube oils accumulate. At existing system of clearing of drill fluids the flush fluid after use is spilled on tundra, killing all vegetation on the appreciable floor spaces. At input of a field in exploitation the communal level of technogenic stress is foregone increasing. All civil works break natural vegetation of tundra, sometimes completely destroy it. As result the large ranges of a bare ground are formed

The studies, held by us, have shown, that for today in the territory of Urengoy tundra the universal formation of secondary vegetative communities has not taken place yet. However in series of phytocenosises the involvement of meadow species, for example *Chamaenerion angustifolium (L) Holub. [48], Festuca ovina L. [57], Arctagrostis latifolia (R.Br). Greust. [26], Calamagrostis lapponica Harm. [34], C. langsdorffii (Link) Trin. [35]*, that was noted in composition and connections of the constructed correlation pleiades (Fig. 1). More often growth of these kinds is marked on the disturbed meadow communities of flood-lands and on deserted roads of rovers on watersheds. Such increasing of a fraction of these species in composition of vegetative groupings shows beginning processes of meadow forming for separate plots of tundra. The specific composition of vegetative communities is moderated with magnification of anthropogenic load from 15-18 of species up to 2-6. The overground altitude of plants is moderated from 25-40 cm till 10-15 cm. As a result of variation of territory ecological conditions the horizontal pattern of vegetative communities is inflected also. The plant coating is slashed from 100 % in natural ecosystem till 60-80 % in accustoming fields and till 30-50 % in exploited.

The large number of anthropochorous species participates during recovery of phytocenosises of hypoarctic tundra and forest-tundra. The recovery rate of a vegetative and type secondary phytocenosises is instituted depending on damp of dwellings' soils and extent of their disturbance. If fundamental phytocenosises are erased only partially and the basic pattern of natural communities was kept, the growth of separate cereals is marked. If the fundamental vegetation was erased completely, but thus the high layer of soil is not disturbed, most typical a

path of recovery - formation of meadows of tundra. At destroy vegetation of overdamp dwellings or at strong damage of soils in dry microcomplexes and, as a consequent, magnification of thawing zone of permafrost, the process of recovery phytocenosises goes on a path of secondary bogs formation - pleiad XX

Conclusion

Thus, for today for territory of Urengoy' tundra the conservation representative phytocenosises with active involvement of hypoarctic Siberian and Euroasian species is characteristic. Advance of boreal vegetation on north and gradual displacement lichen by grassy species however is marked. Besides as a result of mechanical load on vegetation and soils the variation natural phytocenosises in tundra ecosystems goes on two directions. On the one hand, on is gentle the disturbed sandy soils the process of formation tundra meadows, with another begins, at strong damage of a soil there is a process of formation secondary bogs of leases with sedge-horse-tail communities. As result, at further magnification of mechanical stress on tundra ecosystems, there can be a fall-off of a specific variety and without that rather poor phytocenosises, and, hence, and decrease of stability northern ecosystems to technogenic load.

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