

Forestry

Typology of East Georgian Open Juniper Woodlands

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ABSTRACT. This paper provides new data on East Georgian open juniper woodland types and associations. The typology of open juniper woodlands has been studied on 8 sampling plots. Phytocenosis composition, average height and diameter, age, growth class, natural regeneration rate, status of forest understorey and herbaceous cover were determined. © 2011 Bull. Georg. Natl. Acad. Sci.

Key words: *type, association, open juniper woodlands.*

Typology (types and associations) of the subarid open juniper woodlands was studied in the western part of their distribution range, Tbilisi environs, Skhaltba (Sarkineti), Zedazeni, Armazi, Karsani and other ridges as well as in the eastern part - Vashlovani reserve.

M. Svanidze [1] provides a definition of a forest type based on typology of V. Sukachev "Forest type is a union of forest areas with homogeneous composition of forest species, fauna, microbial population, climate, soil and hydrological conditions" [2].

Phytocenosis or plant association, as it is often referred to in forest typology, is considered a main component of the forest type as the forest type border is determined by the phytocenosis (association) boundaries. A forest type may include several associations.

A fairly large area is required to define a forest type. Sampling plots of standard size are used for identification of associations [1]: 0.25 – 0.5 ha for dark conifers and beech tree forests, no more than 0.25 ha – for pine and oak tree stands of low density. For open juniper woodlands sampling plot size is not determined, however, 0.05-0.1 ha is regarded as acceptable. In typology geobotanists generally use association. In case of junipers it is more acceptable due to small areas.

The types of East Georgian open juniper woodlands were studied by M. Svanidze [3, 4].

We have described the type of *Juniperetum botriochloosum* on the southern exposition of Sarkineti range slope with inclination of 15-20°. 1000 sq.m standard sampling plot at 500 m above sea level, growth class IV, cinnamonic soil of medium thickness. The upper storey is provisionally comprised of two layers. Canopy density is 0.3-0.4 by visual estimation. The first layer is composed of: *Juniperus foetidissima* - 50% (age - 100 years, H=3.5 m, D=4cm), *Juniperus polycarpos* and *Juniperus oxycedrus* - 30%, *Quercus iberica* - 10%, *Carpinus orientalis* - 10%. Composition: 8J.1Q.1Carp.or.

The second layer: *Rhamnus pallasii*, *Spiraea hypericifolia*, *Paliurus spina-christi*, *Lonicera iberica*, etc.

Herbaceous cover: *Bothriochloa ishaemum*, coverage - 50%, *Stipa capillata*, *Bromus japonica*, *Achillea millefolium*, *Xeranthem squarrosum*, *Falcaria vulgaris*, etc.

Regeneration is low (1000 established young plants per 1 ha).

The type of *Juniperetum spinoso-fruticosum* was described on the southern slope of Sarkineti range. 1000 sq.m standard sampling plot at 550 m above sea level, inclination 20-250, thin cinnamonic soil, growth class IV. The upper storey is provisionally comprised of two layers. Canopy density is 0.3 by visual estimation. The first

layer is composed of the following species: *Juniperus foetidissima* - 50%, *Juniperus polycarpos* - 20%, *Juniperus oxycedrus* - 30%. Composition: 5*J.f.* 3*J.ox* 2*J.pol.* Average H=3m, D=4cm, age - 100 years.

The second layer: *Paliurus spina-christi* - 40%, *Rhamnus pallasii* - 20%, *Spiraea hypericifolia* - 20%, *Cotinus coggygria* - 10%, *Ephedra procera*, *Lonicera iberica*, *Berberis iberica*, etc.

Herbaceous cover: *Bothriochloa ishaemum*, coverage - 3 %, *Stipa capillata*, *Artemisia fragrans*, *Falcaria vulgaris*, *Phleum pratense*, *Bromus japonicus*, *Achillea millefolium*, etc.

Juniperetum festucosum was described on the slope of the southern exposition of Sarkineti range, 450 m above sea level, inclination 20°, thin cinnamonic soil, growth class IV. The canopy density is 0.3-0.4. In the first layer: *J.foet.* - 50%, *J.ox.* - 30%. *J.pol.* - 15%, *Carpinus orientalis* - 5%. Composition: 10*J.* (all three species) + *Carp.or.*

Hemixerophyte thorny shrubs are slightly developed in the understorey; their total coverage is 20-25 %.

Festuca sulcata (80%) is dominant in the herbaceous cover. *Stipa capillata* and *Bromus japonicus* are very rare. Regeneration is very poor, 400 established young plants per ha.

The type of *Juniperetum mixtoherbosum* was studied on the road to Shiomghvime. 500m above sea level, standard sampling plot – 0.1 ha, south exposition. Inclination - 25°, thin cinnamonic soil, growth class IV. Canopy density is 0.2- 0.3 by visual estimation. Composition: 8*J.* 2*Carp.or.* Average juniper H=3.7 m, D=11.9 cm, age – approximately 105 years.

Understorey: *Paliurus spina-christi* equally, *Jasminum fruticosum*, *Cotinus coggygria*, *Lonicera iberica*, *Ruscus ponticus*.

Herbaceous cover: *Artemisia fragrans*, *Achillea millefolium*, etc. Coverage - 30-40%.

The type of *Juniperetum graminosa-mixtoherbosum* was studied on the road to Karsani, 585 m above sea level, south-west exposition, maximum inclination 30°. Standard sampling plot – 0.2 ha, coordinates N41°51'055" E 044°42'957". Thin cinnamonic soil, canopy density is 0.3- 0.4 by visual estimation. Composition: 6*J.f.* 4*J.pol.* singles of *Carp.or.* *J.Foet.* aver. H=3.6 m, D=16.2cm, age – ca 104 years, growth class - IV.

Understorey is distributed evenly, coverage 30-40%: group of *Ruscus ponticus* occupies 14sq.m, *Ligustrum vulgare*, *Cotinus coggygria* 10%, *Lonicera iberica*, *Jasminum fruticans*, *Spiraea hypericifolia*, *Cerasus incana*, *Rhamnus pallasii*, a small number of *Paliurus spina-christi*, *Ephedra procera* - 10%, *Atraphaxis caucasica*, *Astragalus caucasicus*.

Young juniper trees generally grow in groups around large trees. Regeneration is satisfactory, 1200 established young plants per 1 ha.

Herbaceous cover: *Festuca sulcata* (coverage 50%), *Asparagus verticillatus*, *Agropyron pectinatum*, *Bothriochloa ishaemum*, *Stipa capillata*, *Poa densa*, *P.crispa*, *Artemisia fragrans*, *Achillea biebersteinii*, *Allium rotundum*, *Centaurea ovina*, *Euphorbia sequierina*.

Very interesting association of *Cetisieto-Juniperetum mixtofruticosum* was described in Armazi gorge at 700-750 m above sea level. It occurs above the mixed deciduous forest, on the slope of west exposition, inclination over 30°, on rocky ground where soil is very thin, canopy density is 0.2 by visual estimation; growth class IV, standard sampling plot - 500 sq. m, *J. foet.* Is most frequent, maximum H-2.5m, only one individual of *J. oblonga* was observed to be growing, height – 1 m. 20% of the area was occupied by *Celtis glabrata*. Total composition of the cenosis is 8*J.foet.* 2*Celt.gl.*+*J.obl.*

Understorey: *Jasminum fruticans* - 15-20%, *Spiraea hypericifolia* - 30-40%, *Cotoneaster integerrima* - 10-15%, *Lonicera iberica* - 5%, *Rhamnus pallasii*, *Rhus coriaria*, *Rosa canina*, *Rhamnus cathartica*.

We have described the associations of *Pistacieto-Juniperetum jasminosopaliorosum*, [5, 6] in Vashlovani reserve, standard sampling plot -1000 sq.m, north-east slope, inclination 20-25°, 565m above sea level, coordinates: 38T 0618541, UTM4562422. Forest cinnamonic soil of medium thickness, canopy density is 0.4-0.5 by visual estimation. The composition of the association: 8*J.foet.* 2*P.mutic.*+*J.ox.*

Juniperus foetidissima: average H – 3.3 m, age - 102, growth class - IV, average D=11.2 cm. *Pistacia mutica*: average H – 4.2 m, D=13.7 cm.

Understorey is uniform and comprised of *Jasminum fruticans* in groups under *Pistacia mutica* and in open places. *Paliurus spina-christi*: maximum H - 2m, only few individuals of *Ephedra procera*, *Lonicera iberica* and *Rhamnus pallasii*; the following occur on the edges of the sampling plot: *Ligustrum vulgare*, *Atraphaxis caucasica*, *Cerasus incana*, *Caragana grandiflora*, *Cotinus coggygria*, *Cotoneaster integerrima*.

Herbaceous cover: *Agropyron repens*, *Achillea nobilis*, *Achnatherum bromoides*, *Astragalus caucasicus*, *Artemisia fragrans*, *Cilycyrhiza glabra*, *Crinitarioa villosa*, *Falcaria vulgaris*, *Helianthemum lasiocarpum*, *Dictamnus caucasicus*, *Dactylis glomerata*, *Kochia prostate*, etc.

Association of *Pistacieto-Juniperetum jasminosomuscusum* was studied at Datvi ravine, at 362m above sea level in Vashlovani reserve. Coordinates: 38T 06 14412

UTM 45 66 027. The first terrace of the ravine, plain relief. Forest cinnamonic soil of medium thickness. Standard sampling plot - 500 sq.m. The composition of the association: 4*J.foet.* 2*J.ox.* 2*J.pol.* 2*P.mut.* Crown density is 0.4 by visual estimation.

Junipers: average H=3.3m, av. Age - 100 years, average D=10.9 cm. *Pistacia mutica*: average H=3.3m, average D=5.3 cm. Growth class - IV, natural regeneration is satisfactory, 1800 established young plants per 1 ha.

Understorey: *Jasminum fruticans* - 30%, *Cotinus coggygria*, *Berberis iberica* - 10%, *Tamarix ramosissima* - 5-10%, *Lonicera iberica*, *Ligustrum vulgare*.

Herbaceous cover: *Achnatherum bromoides* (*Aristela*), *Bothriochloa ishaemum*, *Cleistogenes bulgarica*, *Onobrychis radiata*, *Teucrium polium*, *Hypericum perforatum*, *Asparagus verticillatus*, *Festuca sulcata*, *Teucrium nuchense*, *Helianthemum salicifolia*, *Helianthemum lasiocarpum*, *Crinitaria villosa*, *Koeleria cristata*, *Linum austriacum*, *Dactylis glomerata*, *Dictamnus caucasicus*, *Aegonychon purpureo-caeruleum*, *Scabiosa rotate*, *Alyssum turkestanicum*, *Pheum phleoides*. Mosses -40%.

Association *Pistacieto-Juniperetum mixtofruticosum*

was studied in Pantishara ravine at 380 m above sea level, Vashlovani reserve. Coordinates: 38T 06 15 015, UTM 45 66 103. The first terrace, 20 m off the floodplain, standard sampling plot - 500 sq. m. Forest cinnamonic soil of medium thickness. The composition of the association: 7*J.foet.* 1*J.ox.* 1*J.pol.* 1*P.mut.* Visual evaluation of crown canopy is 0.3. Junipers: average H=4.3 m, average age - 110 years, average D=13.7 cm. Growth class - IV, natural regeneration - satisfactory, established young plants - 1600 samples per 1 ha.

Understorey: *Paliurus spina-christi* - 30%, *Jasminum fruticans*, *Berberis iberica*, *Cotinus coggygria*, *Ephedra procera*, *Lonicera iberica*, *Cotoneaster meyeri*.

Herbaceous cover: *Achnatherum bromoides*, *Allium rubelum*, *Achillea biebersteinii*, *Bothriochloa ishaemum*, *Bromus squarrosus*, *Cleistogenes bulgarica*, *Cichorium intylus*, *Cricianella angustifolia*, *Dactylis glomerata*, *Falcaria vulgaris*, *Cilicyrrhiza glabra*, *Helianthemum salicifolia*, *Koeleria cristata*, *Thymus tiflisiensis*, *Trifolium campestre*, *Teucrium polium*, *Linum austriacum*, *Aegonychon purpureo-caeruleum*, *Daucus carota*, *Melilotus neapolitanus*, *Potentilla recta*, *Papaver arenarium*, *Plantago lanceolata*, *Teucrium nuchense*.

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სტატიაში მოცემულია ახალი მონაცემები ადმოსავლეთ საქართველოს დვნიანი ნათელი ტყეებისა და ასოციაციების შესახებ. დვნიანი ნათელი ტყეების ტიპოლოგია შესწავლილია 8 სანიმუშო ფართობზე. დადგენილია ფიტოცენოზების შემადგენლობა, ხეების საშუალო სიმაღლე და დიამეტრი, ხნოვანება, ბონიტეტი, ტყის ბუნებრივი განახლების ხარისხი, ქვეტყისა და ბალახოვანი საფარის მდგომარეობა.

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