Types of Dagestan Forests and Peculiarities of their Distribution

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Abstract:

The territory of Dagestan has fewer forests than other regions of the Northern Caucasus. Forests cover about 7 % of the territory of the republic. There are very few forest tracts in lowland. There aren't any forests in the huge area of Tersko-Kumskaya lowland. Small lots of forests remained along the rivers Terek and Sulak. Here they are, basically, made up by different sorts of poplar, willow, ash tree, oak and some other kinds of trees. Southward, in the delta of the Samur, there are food plain forests with hyrcanian elements and different lianas. The main areas of forests in Dagestan are in foothills zone. There they change their species composition and structure depending on the increase of height above sea level. In low parts of foothills oak – pine, juniper and oak light forests with lots of bushes are developed. In upper zone of foothills forests are represented by different combinations of oak, hornbeam and beech. In the Central Dagestan forests mainly consist of Pinus kochiana and in some areas mixed forests with Betula ssp. There are few forests consisting of only birch but here and there one can find them in combination with hornbeam, lime, ash tree, asp and other species. In Southern Dagestan in middle and upper stream of the rivers Samur and Gulgerychai there are almost no forests.In highland part of Dagestan, where amount of precipitations is bigger, areas covered with forests are increasing. Here at the altitude of 1700 meters forests basically consist of three sorts of birch with participation of European hornbeam, some kinds of maple, rowan tree and others.

Key terms: Dagestan, types of forests, distribution

Introduction:

Everywhere impoverishment of flora, richness of species and variety of sylva species is one of the global problems at the modern stage of humanity development. Occupying about 75% of dry land sylvan vegetation plays a key role in maintaining ecological balance across the whole Earth. The state of sylvan phytocenosa is daily and more and more catastrophically effected as a result of direct and indirect influence by first of all anthropogenic processes. Various physiographic conditions in Dagestan make it possible for different forest communities, beginning with lowland flood plain liana forests and birch crooked forests and thickets of rhododendron at a height of 2500 meters, to grow on its territory. Spreading and domination of these or those forest making species are directly dependent on the height above sea level, the quantity of annual precipitations and soil-hydrological conditions.

Materials and Methods:

The working material for the given article was taken from numerous research works of different authors on the study of concrete plots of sylvan vegetation on the territory of the Dagestan starting from 30s of the last century and also the results of more than 10 yearlong research works of the authors of the given article.

Results and Discussion:

The territory of Dagestan has fewer forests than other regions of the Northern Caucasus. Forests cover about 7 % of the territory of the republic. In addition to that, here there are various types of forests typical for the Caucasus.

There are very few forest tracts in lowland. There are not any forests in the huge area of Tersko-Kumskaya lowland. Only small lot of sparse growth of juniper trees is preserved as a record of nature amidst boundless steppe and semi desert landscapes the Eastern Ciscaucasia.

Inundated forests of Low-lying Dagestan are formed on not only the most moistened places but also with the biggest water flowage. They are concentrated on coastal strip of Sulak, Terek and in delta of Samur. English oak prevail in the structure of these woods. Some species of poplars are added there: black and white poplars, European ash, Caucasian hornbeam, bearded alder. In the second layer there grow: common elm, species of willows, common maple, pear Caucasian. Underbrush is formed by species of hawthorn, euonymus European, a guelder-rose, wild alycha, blackthorn, medlar, species of blackberries. From lianas there grow silk vine, cat briar, woodland grape. The grassy layer is mainly presented by mesophilous species: low meadow rue, butterfly orchid, twayblade, species of orchis, horsetail, marsh sandpiper, etc. (Ostapenko et al. 1972; Solovyova 1969, 1970, 1974).

In the bottom part of foothills there is a belt of dry steppes in combination with thickets of xerophytic bushes among which one can often meet *Paliurus spina-christi* Mill., *Rhamnus pallassii* Fisch. et Mey., species of genus *Spiraea*, *Pyrus salicifolia* Pall., *Quercus pubescens* Willd., etc. On the salted places one can find *Tamarix ramosissima* Ledeb. and *Salsola dendroides* Pall. *Stipa capillata* L., *Festuca valesiaca* Gaud., *Phleum phleoides* (L.) Karst., *Koeleria cristata* (L.) Pers., *Artemisia taurica* Willd prevail in herbage (Lvov 1978).

Transition into the forest-steppe belt presented by pine-oak, juniper and oak light forests is observed from the height of 200-250 metres above sea-level. Here considerable areas are occupied also with thickets of prickly bushes – shibliaks (Lvov 1964).

Pine and oak light forests grow on dry stony slopes of the northern foothills beginning from Chiryurt region and up to Tarki to the south-east from Makhachkala. They stretch for more than 50 km. *Pinus kochiana* Klotzsch, *Quercus pubescens* Willd. and *Quercus petraea* subsp. petraea L. ex Liebl., *Carpinus caucasica* Grossh., *Juniperus communis* subsp. *oblonga* (Bieb.) Galushko, *Sorbus graeca* (Spach) Hedl., *Cotinus coggygria* Scop., *Crataegus pentagyna* Waldst. et Kit., *Celtis glabrata* Stev ex Pianch., and others participate in combining of these light forests. Their grassy cover is very rarefied and is made of exclusively xerophyte species: *Secale sylvestre* Host, *Poa bulbosa* L. *Teucrium polium* L. *T. chamaedrys L. and T. orientale* L. *Dictamnus caucasicus Fisch. et Mey. Carex pallescens L. Trifolium arvense* L. *Centaurea squarossa Willd. and C. arenaria Bieb. ex Willd. Linaria genistofolia (L.) Mill. Polypodium vulgare L. Pteridium aquilinum (L.) Kuhn.*

The great interest in the scientific approach is presented by the flora of the juniper light forests which has remained in the region of health resort Talgi and in surrounding of Gubden on limestones of the Cretaceous. In Talgi they are situated on the southern and northeast slopes of the dry ravine Istisu-Kaka. As accompanying elements to Indian juniper here the following species take place *Quercus pubescens* Willd. and *Quercus petraea* subsp. *petraea* L. ex Liebl. *Fraxinus excelsior* L., *Ulmus suberosa* Moench.. One can meet other shrubs such as *Juniperus communis subsp. oblonga* (Bieb). Galushko, *Celtis glabrata* Stev ex Pianch. *Pyrus salicifolia* Pall. *Rhus coriaria* L., *Cotinus coggygria* Scop. *Cerasus incana* (Pall). Spach., *Ephedra procera* Fisch. et C. A. Mey., *Rhamnus pallassii* Fisch. et Mey., *Cornus mas* L., species *Crataegus, Euonymus verrucusus* Scop., *Berberis vulgaris* L., *Lonicera iberica* Bieb., *L. caprifolium* L. and others (Lvov 1968; Magomedova 2010 a and b).

The belt of broad-leaved woods of Foothill Dagestan is presented by oak, hornbeam-oak, hornbeam, beech and hornbeam-beech forests.

The oak woods here are formed by *Quercus petraea* subsp. *petraea* L. ex Liebl. and *Quercus petraea* subsp. *iberica (*Stev. *)* Krassilin., along the banks of the rivers and on slopes of moderate moistening one can meet *Quercus robur* subsp. *robur* L. Woods consisting of oak make a faltering strip on brown, mountain-forest brown soils of different moistening at the heights of 450 and up to 1000 metres above sea level. With the amount of precipitation increase in the oak woods there increases the participation of *Carpinus*

caucasica Grossh., there appear *Fagus orientalis* Lipsky*, Fraxinus excelsior* L*. Sorbus torminalis* L. *Malus orientalis (*Uglitzk.) Juz*. Pyrus caucasica* Fed*. Tilia caucasica* Rupr*.* and *T. cordata* Mill*., Acer platanoides* L*., A. hyrcanum* Fisch. et Mey*. A. campestre* L. *and A. laetum* C. A. Mey*., Corylus avellana* L*. Taxus baccata* L*. Lonicera caucasica* Pall*.* Quite often in places where excessive cutting of oak woods are observed *Carpinus caucasica* Grossh. replace them becoming a dominating breed, forming secondary derivative oak-hornbeam and hornbeam woods. Owing to various ecological conditions the floristic structure of bushes and herbs in oak woods is quite rich. The underbrush of more xerophytic oak woods is made by *Berberis vulgaris* L*., Cotoneaster melanocarpus* Fisch. ex Loudon*, Juniperus communis subsp. oblonga* (Bieb.) Galushko*, Lonicera iberica* Bieb*., Cotinus coggygria* Scop*.*, species of *Crataegus, Rhamnus pallassii* Fisch. et Mey*.* With the increase of moistening there appear *Swida australis* (C. A. Mey.) Pojark. ex Grossh., *Corylus avellana* L*., Rhamnus cathartica* L*., Mespelus germanica* L*., Euonymus europea* L*., E. latifolia* (L.) Mill. and *E. verrucusus* Scop*., Rhododendron luteum* Sweet*, Lonicera caprifolium* L*., Prunus divaricata* Ldb., and other. There are very few pure oak woods remained in Foothill Dagestan, and they are characteristic for more drier, unsuitable for beech and hornbeam growth places of northeast and northwest slopes. With the increase of the height above sea level the difference in the conditions of moistening between northern and western slopes smoothes out a little that leads to emerge of hornbeam and beech woods.

Beginning with the height of 600-700 meter above sea level on the northern slopes and 900–1000 meter on the slopes adjoining to them the oak woods transform into beech, beech-hornbeam woods, where they form their own belt (600–1600 m). Within the limits of the same altitudinal belt (600–900 m) the northern slopes and the slopes conterminous to them are covered with beech, beech-hornbeam woods and the southern slopes are covered with oak woods. Sometimes onto deep gullies of the northern slopes beech woods sink into a strip of oak woods down to the height of 450–600 meter above sea level (Lvov 1960, 1963a, 1981; Lvov and Abachev 1984).

Beech woods of Foothill Dagestan grow on brown mountain-forest and brown forest soils, on clay shale, sandstone and limestone maternal rocks. Taking into account regional and soil-climate features and occurrence of pure long-boled and highly productive forest stands consisting of oriental beech, the beech growth belt can be divided into 3 parts: bottom (450–750 m), central (750–1300 m) and top (1300–1600 m). One can meet the most productive plantings of beech in the central part where there are the most optimum conditions for the of growth oriental beech (Abachev, 1968ab, 1972c).

Pure beech woods in Dagestan have remained only on the slopes which are hard-to-get-to for cutting and transportation. Invariable companion of beech trees is *Carpinus caucasica* Grossh. Quite often one can meet *Quercus petraea* subsp. *petraea* L. ex Liebl*., Q. petraea* subsp. *iberica* (Stev.) Krassilin. and *Q. robur* subsp. *robur* L*., Fraxinus excelsior* L*., Acer platanoides* L*., A. campestre* L. and *A. laetum* C. A. Mey*., Ulmus elliptica* C. Koch*, Tilia caucasica* Rupr*., T. cordata* Mill. and *T. platyphyllos* Scop*., Pyrus caucasica* Fed*., Cerasus avium* (L.) Moench*, Alnus incana* (L.) Moench and *A. barbata* C. A. Mey*., Populus tremula* L*., Salix caprea* L*., Sorbus torminalis* L*., Malus orientalis* (Uglitzk.) Juz*., Pyrus caucasica* Fed*.,*. Near the upper border of spreading one can meet – *Quercus macranthera* Fisch. et Mey. ex Hohen*., Betula litwinowii* Doluch. and *B. pendula* Roth*, Sorbus aucuparia* L*., Padus racemosa* Lam*., Salix cinerea* L*.*. Undergrowth is formed by such species of shrubs as *Sambucus nigra* L*., Corylus avellana* L*., Euonymus europea* L*., E. latifolia* (L.) Mill. and *E. verrucusus* Scop*., Rubus caucasica* Focke*, Lonicera caprifolium* L., *L. xylosteum* L. and *L. caucasica* Pall*., Swida australis* (C. A. Mey.) Pojark. ex Grossh*., Cornus mas* L*., Rhododendron luteum* Sweet*, Viburnum lantana* L. and *V. opulus* L*., Frangula alnus* Mill*.,* species of the genus *Crataegus, Philadelphus caucasicus* Koehne*, Rosa canina* L*.,* *Mespelus germanica* L*.,* and other. One can

seldom meet beech formations in the places where in the undergrowth there are *Hedera pastuchowii* Woronow ex Grossh., *Taxus baccata* L., *Ilex hyrcana* Pojark.. Because of unfavorable conditions, due to high crowns density and specific environment created by beech itself the grass canopy is ill-defined. More often one can meet: *Festuca drymeja* Mert. et Koch, *Melica picta* C. Koch, *Poa nemoralis* L., *Vicia truncatula* Fisch., *Galium odoratum* (L.) Scop., *Sanicula europaea* L., *Dryopteris filix-mas* (L.) Schott, *Athyrium filix-femina* (L.) Roth, *Arum orientale* Bieb., *Phyllitis scolopendrium* (L.) Newm., *Convallaria majalis* L., *Allium paradoxum* (Bieb.) G. Don. f. and *A. ursinum* L., *Scilla siberica* Haw., *Primula sibthorpii* Hoffm. and *P. macrocalyx* Bunge, *Polygonatum glaberrimum* C. Koch and *P. orientale* Desf., *Tamus communis* L., *Salvia glutinosa* L., *Luzula pilosa* (L.) Willd., *Carex sylvatica* Huds., *Viola reichenbachiana Jord. ex Bor., Dentaria bulbifera* L. and *D. quinquifolia* Bieb., *Pachyphragma macrophyllum* (Hoffm.) N. Busch, *Geranium robertianum* L., and other.

At an altitude of 1500 – 1700 meter and higher (1800–1900) beech forests are replaced by light and park oak-groves consisting of *Quercus macranthera* Fisch. et Mey. ex Hohen., birch forests consisting of *Betula litwinowii* Doluch. and *B. pendula* Roth and after-wood subalpine meadows.

There are other species that participate in park oak-groves. Some of them are: *Sorbus aucuparia* L., *Carpinus caucasica* Grossh., *Acer trautvetteri* Medw., *Tilia platyphyllos* Scop. and *T. caucasica* Rupr., *Pyrus caucasica* Fed., *Alnus incana* (L.) Moench. The undergrowth here is thinned and is presented by *Lonicera xylosteum* L. and *L. caucasica* Pall., *Ribes caucasica* Bieb., *Rhododendron luteum* Sweet, *Corylus avellana* L. *Viburnum lantana* L., *Euonymus latifolia* (L.) Mill. and *E. verrucusus* Scop., *Ligustrum vulgare* L. One can meet some species of the genus *Rosa*. Low crown density of woody and shrubby layer favour the rich development of the grass cover. In its floristic structure there are many sylvan, margin, after-forest subalpine pratal species: *Pyrola rotundifolia* L., *Galium odoratum* (L.) Scop., *Dryopteris filix-mas* (L.) Schott, *Sanicula europaea* L., *Aruncus vulgaris* Raf., *Poa nemoralis* L., *Rubus saxatilis* L., *Primula macrocalyx* Bunge, *Polygonatum verticillatum* (L.) All., *Solidago virgaurea* L., *Salvia glutinosa* L., *Lysimachia verticillaris* Spreng., *Astrantia major* subsp. *biebersteinii* (Trautv.) I. Grint., *Betonica macrantha* C. Koch, *Anemone fasciculata* L., *Trollius patulus* Salisb., *Geranium sanguineum* L., *Rubus saxatilis* L., *Astrantia maxima* Pall., *Anthoxanthum alpinum* Á. et D. Löve, *Ranunculus caucasicus* Bieb., *Helictotrichon pubescens* (Huds.) Pilg., Festuca *drymeja* Mert. et Koch, *Trifolium alpestre* L. and white, *Vicia truncatula* Fisch., *Lotus caucasicus* Kupr., *Filipendula vulgaris* Moench., *Origanum vulgare* L., *Calamagrostis arundinacea* (L.) Roth., and other (Lvov, 1964).

Sometimes one can find *Fagus orientalis* Lipsky, *Carpinus caucasica* Grossh., *Salix caprea* L., *Quercus macranthera* Fisch. et Mey. ex Hohen. in birch forest stand consisting of *Betula litwinowii* Doluch. and *B. pendula* Roth. They form either narrow strip above the upper border of the forest or islets on the background of after-forest and subalpine meadows developing on pratal-silvan soils. Suchlike species as in oak-groves grow in the underbrush.

There are birch groves with juniper in the undergrowth with well-developed grass cover and with *Rhododendron luteum* in the undergrowth with dominating *Anemone fasciculata* L. Pure birch forests rarely grow in the upper limit of forest vegetation of foothills (Lvov and Abachev 1984).

Woods in the Central Dagestan (basically pine woods consisting of *Pinus kochiana* Klotzsch) are concentrated on the northern slopes. There are either mixed massifs with participation of the species *Betula, Carpinus caucasica* Grossh., *Acer platanoides* L., *Tilia cordata* Mill., *Pyrus caucasica* Fed., *Fraxinus excelsior* L., *Ulmus scabra* Miller, *Populus tremula* L., *Quercus macranthera* Fisch. et Mey. ex Hohen. and other. There are *Prunus divaricata* Ldb., *Swida australis* (C. A. Mey.) Pojark. ex Grossh., *Rhamnus pallassii* Fisch. et Mey. and *Rh. cathartica* L., *Rhododendron luteum* Sweet, *Viburnum opulus* L., species of

the genus *Rosa, Euonymus verrucusus* Scop., *Juniperus communis* subsp. *oblonga* (Bieb.) Galushko, *Cotinus coggygria* Scop., *Lonicera iberica* Bieb., and some other growing in the underbrush. Herbaceous layer is thinned out and one can find in various associations different species of *Botriochloa ischaemum* (L.) Keng, *Elytrigia intermedia* (Host) Nevski, *Hypericum perforatum* L., species of the genus *Thymus, Teucrium chamaedrys* L., *Salvia canescens* C. A. Mey., *Stipa capillata* L., *Allium rupestre* Stev., *Centaurea phrygia* L. and other depending on the height and density of tree crowns.

In the area of forest belt replacement by after-forest steppe meadows at a height of 1500 – 2300 meter one can observe pine replacement with some types of birch. Birch forests grow here on the slopes of the upper exposition with humus – carbonate, mountain-wood and mountain-pratal soils.

Slope tops of the after-forest belt are occupied by mesophilous gramineous-herb meadows. In their herbage one can meet *Calamagrostis arundinacea* (L.) Roth, *Agrostis capillaris* L., *Brachypodium pinnatum* (L.) Beauv., *Geranium sanguineum* L., *Filipendula vulgaris* Moench., *Alchemilla sericata* Rchb., and other (Lvov, 1978).

Woods in Highland Dagestan occupy quite large territories and consist mainly of pine, birch and pine-birch formations. In some areas woods entirely cover slopes touching subalpine meadows on the upper border. In tree layer combining there participate: *Pinus kochiana* Klotzsch, *Betula litwinowii* Doluch., *B. pendula* Roth, *Populus tremula* L., *Acer trautvetteri* Medw., *Sorbus aucuparia* L., *Tilia caucasica* Rupr., *Fagus orientalis* Lipsky, *Carpinus caucasica* Grossh., *Alnus barbata* C. A. Mey., *Salix caprea* L., *Padus racemosa* Lam.. Various types and species of shrub and subshrub grow in the underbrush. They are: *Spiraea hypericifolia* L., *Daphne mezereum* L. and *D. glomerata* Lam., *Rhododendron caucasicum* Pall., *Vaccinium myrtillus* L., *V. vitis-idaea* L., *Juniperus communis* subsp. *oblonga* (Bieb.) Galushko, *Berberis vulgaris* L., *Lonicera xylosteum* L., *L. caucasica* Pall., *R. orientalis* Desf., *Euonymus verrucosus* Scop., and other. Herbaceous layer is formed by *Calamagrostis arundinacea* (L.) Roth, *Pteridium aquilinum* (L.) Kuhn, *Poa nemoralis* L., *Galium odoratum* (L.) Scop., *Oxalis acetosella* L., species of the genus *Pyrola, Goodyera repens* (L.) R. Br., and other (Lvov, 1964).

Birch forests in their spreading accompany pine woods and may replace the first ones after cutting or in the result of successional processes. The limits of altitude spreading are higher than those of pine woods. The lower border passes at a height of 1500 – 1600 meter, the upper border reaches the height of 2500 meter and sometimes higher. Accompanying species of all layers do not differ greatly from those of pine woods. Different types of birch forests are described here (Abachev, 1968 c).

There are small sparse plots of deciduous woods with oriental beech dominating in the South-West Dagestan among pine and birch forests at a height of 1700 and up to 2300 meter within the borders of Tzuntinskiy district. The same species as in the pine and birch forests with the exception of *Corylus colurna* L. participate to some degree in the tree layer. In the undergrowth besides the species typical for pine and birch woods there are: *Euonymus latifolius* (L.) Mill., *Viburnum lantana* L., *Corylus avellana* L., *Philadelphus caucasicus* Koehne. The herbaceous layer is formed by *Galium odoratum* (L.) Scop., *Dryopteris filix-mas* (L.) Schott, *Stellaria holostea* L., *Euphorbia macroceras* Fisch. et Mey., *Oxalis acetosella* L., species of the genus *Pyrola, Festuca drymeja* Mert. et Koch, *Calamagrostis arundinacea* (L.) Roth, seldom *Helleborus caucasicus* A. Br., and other (Omarov 1968 a and 1986).

In the South Dagestan (the basins of the rivers Samur and Gulgerychai) there are practically no forests. That is connected with the aridity of the climate.

In the subalpine belt on the northern slopes one can often meet birch crooked forests and thickets of *rhododendron caucasicum*. Large territories here are occupied by bilberry

bushes. In their composition one can find *Vaccinium myrtillus* L. *V. vitis-idaea* L., *Empetrum caucasica* (V. Vassil.) Juz., *Dryas caucasica* Juz., and other (Abachev 1970 and 1972 a).

Thus in spite of the insignificant territories occupied by woods there is a great variety of xylium types presented in various natural-climatic zones in Dagestan.

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