Geobotanical Description of Leguminous Plants on Dry Steppes of Steppe Plateau

Gunay Nasibova

Azerbaijan State Agrarian University, 450, Ataturk avenue, Ganja, AZ2000, Azerbaijan

ABSTRACT

Data about formations and associations of legume fodder crop group of the steppe vegetation cover of Steppe Plateau have been shown in the paper. Classification of dry steppe plants is limited by 1 type (Steppe), 2 formation classes (shrub-bean-cereal dry steppes and moutley grasses-leguminous dry steppe); 3 formations groups (Astragaletum-Stiposum, Onobrychisetum-Festucosum and Artemisetum-Astragalosum), 4 association class (Astragaletum mollis-Stiposum capillata; Onobrychisetum vaginalis - Festucosum ovina; Onobrychisetum iberica-Festucosum giganteum; Artemisetum fragrans-Astragalosum microcephala) and 4 association groups (Astragalus mollis+Stipa capillata+ephemeretum; Onobrychis vaginalis+ Festuca ovina + ephemerotetum; Onobrychis iberica+Festuca giganteum+herbosum; Artemisia fragrans+ A. Caucasia+A.campestris+Astragalus microcephala+Trifolium striatum+Lotus tenuis). Each association contains about 30-45 plant species, in each of which the legumes play role of ecosystem engineering (or plant edificator).

Keywords: Leguminous plants, steppe vegetation, formation, association

INTRODUCTION

More than 12 speci plants types are found in the Azerbaijan Republic [Hajiyev, 2007]. These vegetation are rich by various areal elements. The xerophile and steppe areals is widely distributed basically in the Steppe Plateau and the Kur-Araz lowland. Floristic and geobotanical studies of steppe vegetation after A.A. Grosssheim [1932] and L.I. Prilipko [1970] has been interest area of modern scientist [Hatamov, 2000; Shukurov, 2003; Ibrahimov, 2007; Gurbanov et al., 2013; Ibadullayeva, 2013; Qasimzade, 2015]. Desert, semi-desert, mountain xerophyte-frengana, meadow and forest vegetation types are meets in the Steppe Plateau. Dry steppe vegetation formed by legumes at 500-1100 meters above sea level, in different reliefs, in light gray-brown soils as shown results of study.

According to L.I.Prilipko [1970] A.P.Sennikova under the term "steppe" implied xerophytes edipicators in steppe associations, especially grass-forming cereals and single bushes. At the same time, V.V. Hatamov [2000] shows that steppe vegetation is predominant in calcium carbonate-rich soils, where the surface and underlying parts are interconnected, heat-and-frost-resistant, xerophyte, turf-forming, and root-bearing plants.

Steppe vegetation of Azerbaijan are formed in Gobustan, Bozdag-Jeyrancol (Steppe plateau), in low and middle mountain part of Nakhchivan AR, Talysh (Lankaran), in the lower foothill zone of the Greater and Lesser Caucasus as can be seen from “Global Geographic Information Map of Azerbaijan” [2005], “Ecological-geobotanical map of some phytocenoses fomed by legume plants in the natural vegetation of Azerbaijan” [2013].

Scientists point out that dry, grain-moundly grass, cereal and meadows steppe vegetation are spread in Azerbaijan, where this crop has been widely distributed before zonality, and now it has shrunk in the form of spots. The main reason for this is the strong effect of human activity on the
relevant plant. Over time, V. Hajiyev and S. Musaev also noted role of legume species in the analysis of the formations [1996].

Considering all of this, it is intended to study the geobotanical description of associations of legume fodder plants in the steppe vegetation of the botanical geographical area of Azerbaijan - Steppe Plateau.

MATERIALS AND METHODS

The research of the steppe vegetation type covering the Steppe Plateau of the Azerbaijani flora was carried out in 2016-2019. Classical and modern botanical, floristical, ecological, and static methods have also been used: the floristical observations by Beydeman [1954]; developmental features of ontogeny by Rabotnov [1983]; ecological analysis of plants by Shengnikov [1950]; Life forms by Serebryakokov [1964]; the ecological features are based on Yaroshenko [1969]. Plant names have been given in accordance to "Flora of Caucase" [2008], note the "Azerbaijani flora" [1950-1961], and by the latest nomenclature [Askerov, 2016].

RESULTS AND DISCUSSION

The study covered the Steppe Plateau area. The plants collected during the expeditions were identified and their relationship to environmental factors was studied. Modern environmental and phytocenological classification of plant cover is given at the level of species, formations and associations. The herbaria collected before (mainly dominant, subdominant and unknown) during field studies were assigned, and all taxons were characterized by analyzing the recorded geobotanical descriptions. The gray-brown, gray, gray-chestnut soils formed in the zone of dry steppe on the Steppe plateau have been studied by steppe type legume phytocenos. It should be noted that in the botanical - geographical areas of the Azerbaijan Republic the richest region is Steppe Plateau due to superiority of legumes phytocenos in steppe vegetation. During the research, the main formation class includes formation and associations are specified, summarized and described below.

Bushes-legume-cereal dry steppe formation class. These formation includes two formation classes (Astragaletum - Stiposum and Onobrychisetum-Festucosum). Astragaletum - Stiposum formation group represented by Astragaletum mollis-Stiposum capillata association. Vegetation cover of Astragaletum-Stiposum formation by domination of Stipa capillata has been recorded in light gray-brown soils at 600-700m above sea level in the lowland slopes and in winter pasture areas and the composition of the association is determined. Geobotanical description of leguminous plants of the Astragaletum – Stiposum formation have been studied during the geobotanical researche.


According to ecological groups, 16 species (72.7%) were xerophytes, 1 species (4.5%) was halophytes, and 5 species (22.7%) were mesoxerophytes, which are important in the forming of association. The total project coverage of the association is 60-80%.

The dominant species of the legume-lichen formation is Stipa capillata with abundance by 3-4 ball, subdominants are Astragalus sp. species with abundance by 2-
3 balls as shown the geobotanical description.

The appropriate phytocenosis is 3-storey according to the structure: I floor - *Rhamnus pallasii* bushes by height 120 cm; 2nd floor - *Salsola dendroides*; on the third floor - *Stipa capillata, S.szoritsiana* and etc. herbs (by height 20-40 cm). The overall project cover ranges between 60-80%. It is important to add that *Collemia cristatim* (L.) Web. species is rarely scattered.

**Onobrychisetum–Festucosum** formation group formed by two associations: *(Onobrychisetum iberica– Festucosum giganteae) and Onobrychisetum vaginalis – Festucosum ovina*.

Formations is found in steppe vegetation, gray-brown soils (bushy pastures). Abundance of *Festuca ovina* - dominant of *Onobrychisetum vagins* - *Festucosum ovina* association - and subdominant *Onobrychis vaginalis* species are the same - 2 balls. 30-35 plants species are present in in the plant cover. The overall project cover ranges between 60-70%. Abundance of dominant *Onobrychis iberica* of *Onobrychisetum iberica* - *Festucosum giganteae* association is 3 ball and subdominant *Festuca gigantea* species by 2 ball. 30-35 species of plants were found in this association. The overall project cover is between 70-90%. The main feed crops are distributed in the bushy-legume-cereal dry steppe crop vegetation, including *Astragalus mollis, Onobrychis vaginalis, O.iberica, Festuca ovina*, etc. legume fodder plants in winter pastures, also resistant to drought and frost. *Artemisietum – Astragalosum* formation group and *Artemisietum fragrans-Astragalosum microcephala* association are presented in the study area. It is mainly “peaks” of winter pasture. Various species of wormwoods are found in *Astragaletum* formations (*Artemisia fragrans* Willd., *A.caucasica* Willd., *A.campestris* L., *A.scorpia* Waldst. & Kit.) and Caucasian brome (*Bothriochloa bladhii* (Retz.) S.T.Blake), Japanese brome (*Bromus japonicus* Thunb.), Blue hair grass (*Koeleria albovii* Domun.), cock’s-foot (orchard grass, or cat grass) (*Dactylis glomerata* L.), foxtail grass (*Alopecurus pratensis* L.) also more distributed.

The vegetation cover of association was recorded in the foothills at 900-1000 m above sea level in mountain gray-brown soils. *Astragalus microcephala* is dominant of the formation with abundance - 3 ball, subdominant *Artemisia fragrans* - 2 ball. Bushes-legumes-cereal and moutely grass-legume formation classes are distribudet at 500 to 900 m above sea level, on low territories extends on semi-desert phytocenosis. The study concluded that the species composition and structure of both plantation types differ greatly.

Classification of dry steppe vegetation have given:

**TYPE: STEPPE**

**FORMATION CLASS:** 1. Bushes-legume-cereal dry steppe

**FORMATION GROUP: **Astragaletum-Stiposum

**ASSOCIATION CLASS:** Astragaletum mollis-Stiposumcapillata

**ASSOCIATION GROUP:**Astragalus mollis + *Stipa capillata*+ ephemrectum

**FORMATION GROUP: **Onobrychisetum-Festucosum

**ASSOCIATION CLASS:**Onobrychisetum vaginalis - Festucosum ovina

**ASSOCIATION GROUP:**Onobrychis vaginalis+ Festuca ovina + ephemrectum

**ASSOCIATION CLASS:**Onobrychisetum iberica-Festucosum giganteum

**ASSOCIATION GROUP:** Onobrychis iberica+ Festuca gigantea+herbosum

**FORMATION CLASS:** 2. moutely grasses-leguminous dry steppe

**3.FORMATION GROUP:Astragalosum**

**ASSOCIATION CLASS:**Artemisietum fragrans-Astragalosum microcephala

**ASSOCIATION GROUP:** Artemisia fragrans+ A.caucasica + A.campestris +Astragalus microcephala + *Trifolium striatum*+Lotus tenuis
Classification of dry steppe vegetation of botanical-geographical area Steppe Plateau is limited by 1 type, 2 formation class, 3 formations group and 2 associations. As can be seen from the classification scheme of the steppe vegetation, these phytocenose-specific groups consist of bushy-legume-cereal and different dry legume formations. Geobotanical descriptions of man leguminous plants in dry steppe of Steppe plateau have shown in table 1.

### Table 1. Geobotanical description of leguminous plants in dry steppe.

<table>
<thead>
<tr>
<th>№</th>
<th>Name of the Biomorphic species</th>
<th>Ecological groups</th>
<th>Abundance (by ball)</th>
<th>Medium height (by cm)</th>
<th>Phenological phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bushes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Astragalus microcephalus Willd.</td>
<td>xerophyte</td>
<td>1-2</td>
<td>II (60)</td>
<td>flow.</td>
</tr>
<tr>
<td>2</td>
<td>Astragalus oleifolius DC.</td>
<td>mesoxerophyte</td>
<td>1-2</td>
<td>II (40)</td>
<td>veget.</td>
</tr>
<tr>
<td>3</td>
<td>Lagonychium furcatum (Banks &amp; Soland. Bobr.)</td>
<td>xerophyte</td>
<td>1</td>
<td>I (120)</td>
<td>flow.</td>
</tr>
<tr>
<td>4</td>
<td>Ononis pusilla L.</td>
<td>xerophyte</td>
<td>2-3</td>
<td>III (30)</td>
<td>flow-beans grow.</td>
</tr>
<tr>
<td>5</td>
<td>Astragalus xiphidium Bunge.</td>
<td>xerophyte</td>
<td>1-2</td>
<td>II (70)</td>
<td>flow.</td>
</tr>
<tr>
<td>6</td>
<td>Perennial (herbs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lotus tenuis Waldst. et Kt. ex Willd.</td>
<td>xerophyte</td>
<td>1</td>
<td>II (30)</td>
<td>beans grow.</td>
</tr>
<tr>
<td>8</td>
<td>Medicago canariensis Less. ex Lebed.</td>
<td>xerophyte</td>
<td>1</td>
<td>II (45)</td>
<td>flow.</td>
</tr>
<tr>
<td>9</td>
<td>Dorycnium intermedium Ledeb.</td>
<td>mesoxerophyte</td>
<td>1</td>
<td>II (25)</td>
<td>flow.</td>
</tr>
<tr>
<td>10</td>
<td>Biennial herbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Melilotus dentatus (Waldst. et Kt.)Pers.</td>
<td>mesoxerophyte</td>
<td>1</td>
<td>II (20)</td>
<td>flow.</td>
</tr>
<tr>
<td>12</td>
<td>Glycyrrhiza aspera Pall.</td>
<td>xerophyte</td>
<td>1-2</td>
<td>II (15)</td>
<td>beans grow.</td>
</tr>
<tr>
<td>13</td>
<td>Annual herbs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Medicago arabica (L.) Huds.</td>
<td>mesoxerophyte</td>
<td>1-2</td>
<td>II (25)</td>
<td>beans grow.</td>
</tr>
<tr>
<td>15</td>
<td>Lotus angustissima L.</td>
<td>mesoxerophyte</td>
<td>1-2</td>
<td>II (15)</td>
<td>flow.</td>
</tr>
<tr>
<td>16</td>
<td>Astragalastrudibuloides Delile</td>
<td>xerophyte</td>
<td>1</td>
<td>III (10)</td>
<td>beans spillage.</td>
</tr>
</tbody>
</table>

Legumes spread on dry steppes are xerophytes and mesoxerophytes adapted to xerophytization as can be seen from the table.

**REFERENCES**


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