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Pasture condition of the dry steppe in Mongolia

/ Case study of Altanbulag soum, Tov province, Mongolia /

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Introduction

The steppe vegetation community type is widely distributed in the Mongolia. For the most important indicator of the steppe is dominant plant *Stipa krylovii* and sub dominant is *Cleistogenes squarrosa*, *Koeleria macrantha*, *Agropyron cristatum*. The *Cleistogenes squarrosa* - *Stipa krylovii* steppe which is covering in the wide plateau steppe between lower high mountains and south slope of hill is widely spreaded in the steppe regions of the Mongolia (Yuantov, 1950).

Keywords: Canopy cover, biomass, pasture degradation

Study areas and Metods

The study was included the areas of Altanbulag soum Tuv province of Mongolia. Throughout Mongolia the climate is extremely continental.

Altanbulag soum Tuv province has 566866 hectare area while its livestock population is 182670 sheep unit .

Material and Metods

During the field work we did total 60 geobotanical recording and collected 360 plant biomass samples for the pasture condition determination.

We did detailed geobotanical recordings using the method by A. P. Shennikov (1964) to determine a species composition and to estimate a canopy cover of vegetation. At each site, we conducted 3-5 replicates of geobotanical assessment within plots (standart stand size was in the steppe 1m x 1m=1 m²).

For the estimation of relative abundance of species we used an evaluation of O.Drude (Shennikov 1964). Nomenclature followed V. I Grubov 1982 (The Key to Vascular Plants of Mongolia).

Plant biomass samples were taken by the method by I. A. Larin (1956). All plant biomass samples were dried in air and weighed in lab using electron balance with 0.1g scale. Classification of pasture degradation by O.Chognii (2001) is method used to define pasture degradation.

Result and discussion

The recent situation of vegetation cover and communities, plant biomass and yield were assessed and pastureland utilization was determined during the field research in summer 2009.

Vegetation

According to vegetation-geographical classification, the study area includes into Eurasian steppe region, steppe zone of Dundad Khalkh.(Ulziikhutag, 1989).

During the field survey have been observed that such communities as *Forb-Neddlegrass*, *Neddlegrass-forb-sagebrush* have been dominated in foot hills of mountain, and such communities as *Grass-Caragana*, *Neddlegrass-Forbs*, *Sedge-Grass*, *Sage-Sedge* have been dominated in south face slope of mountain, and such communities as *forb-Caragana*, *Cleistogenes-Stipa-Caragana*, *Stipa-Elymus-Sedge*, *Sedge-Sage*, *Elymus-Sage* in the dry steppe.

Vegetation structure and composition of the pastures under different grazing intensity was calculated using ArcView 3.2 software. We investigated biomass (yield) determined during the 2009 growing season

Total pasture area of Altanbulag soum 15% is slightly grazed, 29% is moderately grazed, 56% is overgrazed used.

1. **Slightly grazed pasture.** This is level pasture widespreaded on the top and back side in mountain. General image forb-neddlegrass community (Fig.2).



Fig.2 . Forb-
Neddlegrasses
community

Canopy cover of green plants was 65-70%, bare ground was 30-35%. Eight plant species on average was recorded per square meter. Height of vegetative tissue was 7.0-8.5 cm on average and generative tissue was 13.0-15.5 cm. Dominant species was *Stipa krylovii* from grass, subdominant was *Cleistogenes squarrosa*, *Agropyron cristatum*, from forb *Potentilla acaulis*, from sage were *Artemisia frigida*, *Artemiisa adamsii*, from sedge was *Carex duriuscula*.

Total plant average biomass was 58.3g/m² of which 37.8% was a grass; 34.2% was a forb; 19,1 % was a sage; 8.2% was a sedge; 0.7% was a legume (Table 1; Figure 3 and 4)

Pasture use		Lightly grazed	Moderately used	Ovegrazed
Total plant biomass		58,3 g/ m ²	40,1 g/ m ²	46.0 g/ m ²
From which by per cent				
By functional groups:	Grass	37,8	33,0	8,6
	Forb	34,2	14,0	12,0
	Sage	19,1	33,3	63,3
	Sedge	8,2	5,2	10,8
	Legume	0,7	11,6	4,6
	Horsetell	0.0	2,9	0,7

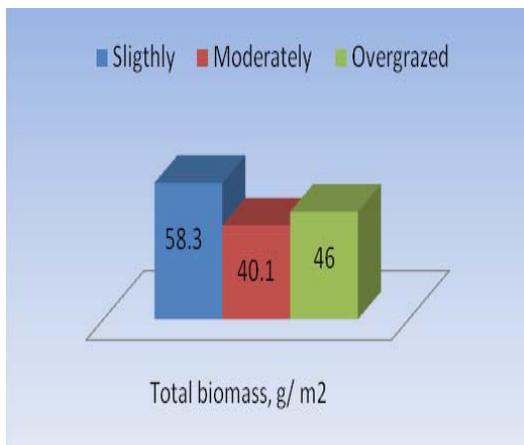


Table 1.

Composition of total plant biomass (by per cent, %) of different grazing pasture of Altanbulag soum areas.

Species number per square meter	8.1	9.2	8.2
Canopy cover (%)	65-75		

Fig.3. Total plant biomass of different grazing pasture of Altanbulag soum.

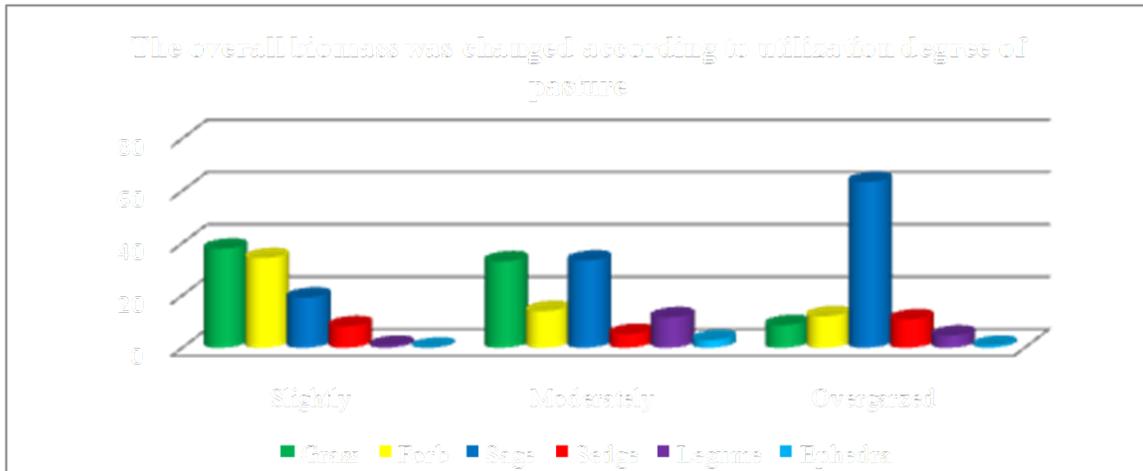


Fig.4. Composition of total plant biomass of different grazing pasture of Altanbulag soum areas

2. Moderately used pasture. This is level pasture widespread on the mountain steppe, plateau steppe. General image of sedge-grass community (Fig.5).



Fig.5. *Carex duriuscula*-*Elymus chinensis* community

Canopy cover of green plants was 65-85, bare ground was 20-35%. Nine plant species on average was recorded per square meter. Height of vegetative tissue was 4.2 cm on average and generative tissue was 8.0 cm. Dominant species is *Cleistogenes squarrosa*, from grass, subdominant was *Agropyron cristatum*, *Stipa krylovii* from forb *Potentilla bifurca*, *Potentilla acaulis*, from sage were *Artemisia frigida*, *Artemiisa adamsii*, from sedge was *Carex duriuscula*, was *Ephedra sinica* of draftshrub and *Lappula intermedia* of annual plant.

Total plant average biomass was 40.1g/m² of which 33.0% was a grass; 33.3% was a sage; 14.0% was a forb; 11.6% was a legume; 5.2% was a sedge; 2.9% was a *Ephedra* (horsetell) (Table 1; Figure 3 and 4).

On the moderately used pasture the biomass of sage and horsetell is increased such as capacity of the grass.

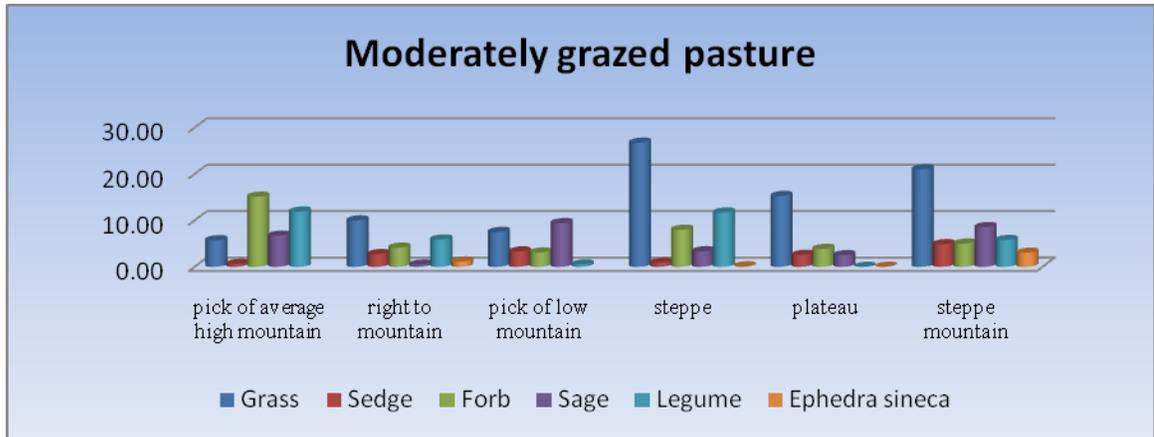


Fig.6. Composition of functional groups plant biomass of moderately used pasture in Altanbulag soum areas

3. Overgrazed pasture. This is level pasture widespread on the river valley such as summer pasturelands which have many herders and mountain steppe such as autumn and winter



pasturelands. General image of sedge-sage community (Fig.6).

Fig.6. *Carex duriuscula*-*Artemisia adamsii* community

Canopy cover of green plants was 50-60%, bare ground was 45-55%. Eight plant species on average was recorded per square meter. Height of vegetative tissue was 7-9 cm on average and generative tissue was 5-6 cm. Dominant species is *Artemisia Adamsii* from sage, subdominant was from sedge *Carex duriuscula*, from grass *Cleistogenes squarrosa*. Grass such as *Stipa krylovii* and *Agropyron cristatum* is abundance straightly decreased.

In resent years, global change also effected on pasture plant composition, growth rate and plants bioproductivity.

Total plant average biomass was 46.0 g/m² of which 63.3% was a sage; 12.0% was a forb; 10.8% was a sedge; 8.6% was a grass; 4.6% was a legume; 0.7% was a *Ephedra* (horsetell) (Table 1; Figure 3 and 4).

On the overgrazed pasture the biomass of sage is increased untill 63.3% such as amount of the grass.

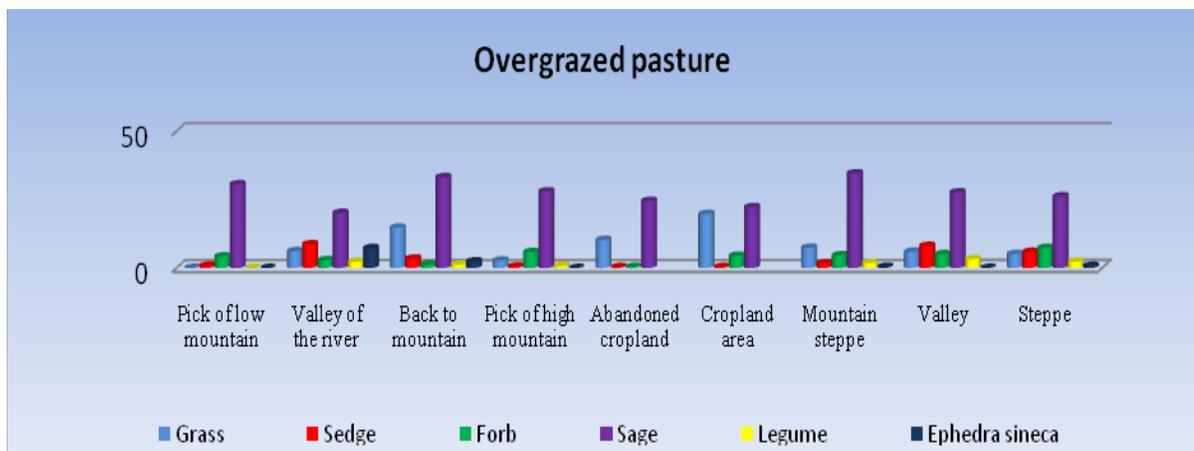


Fig.8. Composition of functional groups plant biomass of overgrazed pasture in Altanbulag soum areas

Hovewer, the total biomass of moderately used and overgrazing pastures are same (40.6-40.7g/m²), Grass's biomass by percent of the slightly used and moderately used pasture is occupied (37.8-33.0%). The amount of sage percents has increased by 2-3 times which can be (33.3-63.3 g/m²).

Conclusion

About 80 percent`s total areas of Altanbulag soum belong to moderately used and strongly degraded category.

The total plant average biomass in the 58.9 g/m² in slightly used pasture and amount of total plant biomass ranges 40.6 to 40.7 g/m² in moderate and overgrazing pasture. In another amount of total plant average biomass in slightly used pasture is 18.3 g/m² more than amount in moderate and overgrazing pasture.

Also have been observed that sage average biomass increased to 63.3 g/m² and amount of grass average biomass decreased to 8.6 g/m².

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