Short Reports

CHANGES OF CARBON STOCS IN CRYOARID SOILS OF TUVA UNDER THE GRAZING

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Carbon Stocks and the storage of the soil organic matter have been determined by 3 principal factors: values of vegetable matter, entering to soil, the rate of the mineralization of the vegetable leavings and the mechanical structure of soil. The entrance of the Carbon have been conditioned by values the net primary production.

The paper has been considered the peculiarity of the accumulation phytomass and the entering to soil the vegetable leavings on the different sites of the dry steppes.

Grazing on the steppes of Tuva by domestic animals has occurred since the first centuries A.D. and this has contributed to maintain the characteristic openness of the landscape.

In this study we were particularly interested in comparing Carbon Stocks of the dry steppes, at different intensities of human impact, with those of true steppe vegetation. True steppes are characterized by small brunch grasses. The main part of the green phytomass is made up of species which are resistant to trampling and able to regenerate rapidly after being grazed.

We established that the above-ground and below-ground plant material (the total biomass) in moderately grazed site (MG) are 30 t/he and in overgrazed site (OG) – 17 t/he (table 1).

Table 1. The storage of the soil organic matter and Carbon Stocks in Cryoarid soils of Tuva

Components	**MG – 2008 y**	**OG – 2008 y**
Above-ground biomass, t/he	250	180
Below-ground biomass, g/m^2	2800	1600
Entering of the vegetable leavings, t/he	11,5	4,3
Humus, % in the depth 0-10 cm	1,4	1,1
Carbon , t/he in the depth 0-50 cm	45	29

The table presents that the green biomass values of vascular plants were highest on the moderately grazed site and lowest on the overgrazed site. The amount of graminoid biomass decreased with increasing grazing intensity.

Differences of total green biomass values between the UG and OG sites were not statistically different but the value for the OG site was much lower. Below-ground plant material consists of stem-bases and tubers? As well as roots of different length.

Total below-ground increases considerably from the moderately grazed site to overgrazed site. The average from the season entering to soil of the vegetable leavings on the moderately grazed site - 11,5 t/he and on the overgrazed – 4,5 t/he.

The Cryoarid soils this sites differ by content humus. The humus horizon in the soil moderately grazed site contents 1,4% and 1,1%- in overgrazed site. Accordingly the storage of the carbon in this sites differ. In the moderately grazed site the storage of the Carbon in the depth 0-50 cm is 45 t/he. Therefore in this soil various intensity of the humus accumulation. It being known that the soils of the moderately grazed site approximate to the muchhumus types.

Thus, grazing has contributed to maintain the openness of the Ubsunur depression’s landscape. Difference between moderately grazed and overgrazed sites may arise mainly from the different factors that originate their xerophytic character: soil and climatic characteristics, respectively. Summers are very cool and the winters are hot and the soil with a low water storage capacity in the Central Asia.

Moderately grazing of Tuvinian dry steppes is resulted in higher biomass values for the above- and below-ground phytomass, entering of the vegetable leavings to the soil, the storage of the humus, Carbon.

GRAZING PRESSURE INFLUENCE ON THE DRY STEPPES OF TUVA

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Introduction

In this study we were particularly interested in comparing some phytomass properties of different intensities of grazing impact of Tuva dry steppe vegetation.

In Tuva winter pastures were supplied with pump-houses to provide a livestock with water. After collective farm disruption these pump-houses were demolished and pastures were left without water. Many winter pastures were abandoned and herdsman have driven their flocks into river valleys. Many summer pastures transformed into full year ones with heavy grazing impact. Change of stocking rate leads to degradational or restrational succession which can be observed and investigated then and there.

The object of this paper is to describe a degradation and regeneration of grazed steppes as well as a balanced pasture with sustained use. The results obtained in Tuva steppes will allow to establish trends of change in major pools of plant material under different grazing impact. We will attempt also to provide some grounding for evaluation the resistance, i.e. a tendency of a system under impact to remain near to an equilibrium point and the resilience, i.e. the rate of an ecosystem return to the starting point after disturbance, in Central Asia steppe ecosystems (Begon et al., 1986).

Study areas and Methods

The study was carried out between 1996 and 2009 in geographical regions of Central Asia, in the Uvsu-nur depression of Tuva. This depression is located in the southern part of Tuva on the boundary with Mongolia. In Tuva were investigated dry steppes with different grazing impact.

Annual precipitation in Tuva steppes varies from 150 to 170 mm. The seasonal distribution of precipitation is rather constant: 70 – 80% of the annual total falls during the warm half of the year. The yearly mean temperature at Erzin is –4,5°C. The coldest month is January with a mean temperature of -33°C. July is the warmest month with 22,0°C. The growing season, i.e. the period over which the daily mean temperature remains above +10^{o}, lasts 130 – 140 days and the period with temperature above 0°C – 180 – 190 days (Experiment Uvsu-Nur, 1995). The steppes of Uvsu-nur depression belong to the ultracontinental grassland type.

Their species composition is dependent on relief, soil and grazing. One investigated steppe is located on the river terrace, three another ones represent submountain steppes. Erzin steppe is linked to alluvial chestnut soil, submountain steppes to loamy sand chestnut soils.

Erzin overgrazed steppe represents the full year pasture with heavy grazing at present. Moderately grazed Onchaalan steppe is winter pasture over long time Jamaalyg steppe was initially moderately grazed by sheep during winter. Now it is summer pasture with light grazing. Choogey steppe was in the past heavily grazed summer pasture. Since 1995 grazing decreased and now this ecosystem represents a stage of recovery succession.

Definitions and symbols

The following variables of the plant biomass structure are used (Van der Maarel & Titlyanova 1989). G = above-ground green biomass; D = standing dead plant biomass (attached dead); L = litter; R = living roots; Rh = living rhizomes; B = R+Rh living below-ground organs; V = dead below-ground plant biomass; B + V = total below-ground plant biomass.

Field methods

At each site an area of 100 m x 50 m was marked, within which the species composition was recorded in July in each of ten 10 m x 10 m square. For other measurements a series of ten 50 cm x 50 cm square was located at random for each sampling occasion. The vegetation was clipped at the soil surface and the litter was collected. The above-ground plants biomass was sorted into green biomass per species and total standing dead biomass. Litter and lichens, if present, were washed on a sieve to remove soil particles.

Soil monoliths with a surface area of 100 cm^2 and a depth of 10 cm were collected in each square to a depth of 20 cm. The monoliths were washed and the plant material collected on a 0,25 mm sieve. All above-ground and below-ground plant biomass was dried for 24 h at 80 °C and weighed. Below-ground plant material was sieved to separate the fraction with the length > 2 cm. The samples were taken in may, July and September.

Results

Above-ground phytomass in dry steppe is dominated by a few species of perennial grasses and subshrubs. Both the dominants and co-dominants of dry steppes are spatially and temporally dynamic. The variation in dominance structure is most obvious in grassland ecosystem with different grazing pressure. The overgrazed steppe had only two dominants – *Artemisia frigida* and *Cleistogenes squarrosa* (Table 1). In the constantly moderately grazed steppe (Onchaalan) there were five dominants among which usual dominant of dry steppes - *Stipa krylovii* had the greatest contribution (% value). In steppe recovering after heavy grazing for one year four dominants were recorded. Abundance of *Cleistogenes squarrosa* which is typical for overgrazed steppe remained high. At the same time the contribution of *Agropyron cristatum* increased. This change in dominant structure is indicative of the recovery process. In steppe restoring for four years a dominant structure change is still in progress. The contribution of *Stipa krylovii* and *Agropyron cristatum* increased while % value of *Artemisia frigida* and *Cleistogenes squarrosa* decreased. The shift in dominance structure is regulated by the growth and death of plants which have a different resistance to grazing and trampling. Dominance structure is important indicator of pastoral succession.

Above- and below ground reserves of plant material

Dynamics of reserves of plant material different components was investigated in the moderately grazed winter pasture during three years and in overgrazed and in recovering pastures during one season in 1998 (Table 2).

Table 1. Total phytomass (g/m^2, mean+ SE) and phytomass share (%) of dominants (≥ 10%) in dry Tuva steppes under different grazing inpacts. OG – overgrazed, MG – moderately grazed, LG-1 = lightly grazed during 1 year, LG – 5 = lightly grazed during 4 years

Parameters	OG	MG	LG-1	LG – 5
Total phytomass	65 ±	68 ±	58 ±	110 ±
Artemisia frigida	75	15	32	17
Stipa krylovii	-	35	20	36
Potentilla acaulis	6	12	6	4
Cleistogenes squarrosa	11	10	8	6
Agropyron cristatum	-	14	16	22
Total dominants	92	86	82	85

Table 2. Above and below ground standing crops in steppes. For G mean annual, g/m^2 dw, 0 – 20 cm soil layer. OG – overgrazed, MG = moderately grazed, LG-1 = lightly grazed for 1 year, LG –4 = lightly grazed for 5 years

Components	OG	MG	LG-1	LG –5
Green phytomass, G_{max}	65	68	58	110
Standing dead, D Litter, L D+L	95	268	237	230
Living below-ground organs, B	1635	795	1510	1135
Dead below-ground plant material, V	1066	837	1663	1376
Total plant material (G_{max}+D+L+B+V)	2861	1968	3468	2851

There was no significant difference in the G_{max} value among overgrazed, moderately grazed and lightly grazed for one year pastures but there was marked difference between these pastures and the pasture recovering for five years. In the latter the maximal green phytomass value was highest. The amount of graminoid biomass decreased with increasing grazing intensity but the opposite tendency is found for the herbs + semishrubs.

The values for above-ground dead biomass were similar for MG, LG-1 and LG – 5 and much lower for OG – pasture, both regarding standing dead and litter. Standing crop of above-ground phytomass (G_{max} + D + L) was roughly the same (295 – 340 g/m^2) in the recovering and moderately grazed pastures, despite the fact that quantitative species composition was different. In contrast, the overgrazed community had much less standing crop: 158 g/m^2 with 60% dead.

Below-ground standing crop of living organs was lowermost in the moderately grazed pasture and highest for overgrazed one. The high value of B in overgrazed community is due to the large contribution of heavy lignificated roots of *Artemisia frigida*. In steppe recovering for one year the B value is also high. Apparently a root growth was stimulated by the remove of grazing pressure. Below-ground standing crop of dead mass was maximal in LG-1 and minimal in MG. So moderately grazed pasture differs by the lessened standing crop of below-ground living and dead mass.

The different value of standing crop of below-ground living and dead biomass may be connected with as different grazing impact as well as with seasonal and year -–to – year dynamics of below-ground biomass. Below-ground dynamics is regulated by the growth and death of root and rhizomes of different species. The active growth of different organs of plants may occur at different time of the season and vary from year to year (Titlyanova et al., 1999).

The standing crop dynamics of living and dead below-ground organs were followed during three years in moderately grazed steppe. In 1996 the minimum of B differed from maximum by a factor 1.6, in 1997 – by a factor 3.1, in 1998 – 1.2. The mean annual value of B was 720 g/m^2.

The regularity in dead mass dynamics was expressed not so clearly. The minimum of V differed from the maximum by a factor 1.3 – 2.2. The mean annual value of V was 1390 g/m^2, i. e. twice as much as the B value.

Seasonal dynamics of below-ground biomass in steppes with different grazing regime in 1998 was pronounced. In overgrazed steppe B standing crop increased from May up to September while in steppe recovering for one year living biomass decreased during the whole season. The maximal standing crop in the pasture recovering for four years occurred in September after the minimal B- value reached in July. Hence the growth curves for B were different in steppes with different grazing regime. The same is true for V-standing crop dynamics.

So a difference in the standing crop of below-ground biomass associated with seasonal and year –to-year dynamics may be very large. A combination of changes in biomass caused by altered grazing regime as well as seasonal and year- to- year dynamics makes an analyze of a below-ground biomass response to a change in grazing impact difficult.

Conclusions

Changes in the biomass structure of grasslands under different grazing intensity can be expressed as ratios. With increasing grazing impact entering of the vegetable leavings to the soil and the storage of the humus, carbon decrease. Results for the moderately grazed site did not agree entirely with those obtained from dry steppes. The below-ground biomass values were highest at the moderately grazed site although differences with the overgrazed site were not significant.

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ADHESIOGENESIS MODELLING IN A CASE OF SURGICAL CAUSED HORMONAL INSUFFICIENCY

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Last years , the quantity of surgically treated gynaecological diseases, used to be progressively increased. The most frequent surgical intervention is the total or subtotal hysterectomy with\ or without adnexa (in occasion of myoma and adenomyosis).

The percent of this operations is about 38% in Russia, 25% in Great Britain, 36% in USA, 35% in Sweden. The middle age of such a surgically treated women is about 40.5 years old. Its about 76.8% of hysterectomy with ovariectomy were realized to a women of 40-45 years old in Great Britain. In USA the quantity of hysterectomy is about 60000 per year, in 60% of cases accompanied with bilateral ovariectomy.

In fact, the problem of adhesiogenesis is especially actual in operative gynaecology, because in the most cases, gynaecological surgery may attend a high risk of peritoneal adhesions forming, expanding beyond the bounds of pelvis. The rate of morphogenesis pelvic and peritoneal adhesions after obstetrical and gynaecological surgery is about 60-100%. For example, 92.6% - after supravaginal amputation of uterus, 95% - after uterine extirpation.

Postoperative adhesions has a great negative influence on a patients health condition , causes an intestinal obstruction, chronic pelvic pain syndrome, different surgical complications as an injuring of viscera and etc.

Main aim: An assessment of adhesiogenesis level under condition of hormonal insufficiency in the dynamics of a postoperative injury in the experiment.

Materials and Methods

The new experimental method of Adhesiogenesis modelling in a case of hormonal insufficiency was designed to determine the level of adhesive process.This model is reproducible on different kind of experimental animals. It were 30 nubilous female rats (Wistar Line)used in experiment. Their middle age was about 3 month, the weight was near 200 -350 grams. The method was realized by comparison of results of simultaneously provided experiments(a standard operational injury, uterine amputation without ovaries, uterine amputation with ovaries)were assessed under the experiment.

The level of adhesiogenesis in absolute numbers (TVA –total volume of adhesions) was assessed by us on the grounds of received macromorphometric data (length, diameter, thickness, area of adhesions) and devised formula. It is possible to determine and objectively compare the process of adhesiogenesis in different groups.

In accord of earliest classification, all adhesions that were founded were devided on chordal, filiform, arachnoidal, scarious or planar morphological types. Each adhesion was described with a special parameters : diameter and length of a chordal and filiform adhesions, thickness and the area of scarious and planar adhesions.

Taking into account of the chordal and filiform adhesions middle diameter is about 5 and 1.5mm and scarious adhesion thickness is near 1mm, it is enough to define its length(for chordal and filiform adhesions) or area (for scarious adhesions) to identify their volume.

The formula for calculating of the TVA (Total Volume of Adhesions) was:

$$V_{adh} = \Sigma l_{chord.}\pi(d_{chord}/2)^2 + \Sigma l_{filif.}\pi(d_{filif.}/2)^2 + + \Sigma l_{arachn.}\pi(d_{arachn.}/2)^2 + \Sigma S_{scar.}h_{scar.} + \Sigma S_{плоск.}h_{planar.},$$