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The Study Of The Processes, Degradation Factors And The Selection Of Crops For The Restoration Of Bioresourses Capacity Of The Grassland Of Semi-Desert Zones.

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ABSTRACT

The centuries of human impact on ecosystems caused the appearance and progressive growth of the processes of degradation and desertification, which have now become global in nature. Now these areas account for approximately 145 million ha of irrigated land, 170 million ha of rainfed arable land and 3.6 billion ha of pastures. There are about 860 million people here, or almost 20 % of the world's population. As a result of an active human impact on the environment there is a constant change in its ecological status, mainly to the downside. Such adverse changes include the processes of degradation and desertification, caused by the adverse natural preconditions, and, above all, by the unsustainable economic activities in very «fragile» and easily «vulnerable» ecosystems. The article presents the results of a research which was made in the semidesert zone, and was monitoring the processes and factors of degradation of soil and vegetation cover of the grassland of Zhangalinsky area of West Kazakhstan. However, an important task for humanity is the prevention of degradation and restoration of lands disturbed in a process of degradation and desertification. In the semi-desert zone of West Kazakhstan region, one of the ways of improving the condition of devastated and degraded land and improving the efficiency of forage production is the restoration of bio-resource potential of the grassland. Thus, for the improvement of conditions of hayfields and pastures there is a high importance of a correct selection of single-species perennial grasses and their mixtures. The article also contains the results of the research, allowing estimating productivity of perennial grasses in single-species, mixed crops in the conditions of semi-desert zone of West Kazakhstan region to restore the bio-resource potential of degraded meadows and pastures. The research has established the highest productivity of grass mixtures with the participation of Yellow sweet clover and Wheatgrass (0,60-1,03 t/ha of dry weight) compared with a single-species crops of these perennial grasses of a hay use. In a pastures among the perennial grasses the most productive were a single-species crops of Wheatgrass (0.55 to 0.77 t/ha of dry weigt).

Keywords: desertification, degradation, forage areas, a single-species planting, grass mixtures, perennial grasses, forage value, bioresource potential.

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INTRODUCTION

Background to the research.

In a world two billion ha or 23% of the land used by humans are susceptible for degradation in varying degrees. Land degradation occurring in arid and semi-arid areas is called desertification. Desertification is caused mainly by human activities and climate change. The world summit on sustainable development in 2002 recognized that desertification is not only a global environmental problem, but also a sustainable development issue of the 21st century. Over the past 50 years globally, about 2/3 of the arable land was affected by desertification to varying degrees. The main economic consequences of desertification and land degradation are the reducing of the agricultural yields, the reducing of the productivity of pastures, the reducing of animal numbers and their productivity, and a reduction in the export capacity of agriculture [Doskach, 1979; Chang and Zhao, 2006; Hart et al., 1996; Belsky, 1986; Skarpe, 2000; Zhang and Skarpe, 1996].

Currently in the southern regions of the West Kazakhstan region there is a general degradation of natural grassland and desertification of a land. In these areas natural grazing lands are the main sources of feed for farm animals. In this regard, identifying processes and factors of degradation and desertification of the grassland semi-desert of Western Kazakhstan region is an urgent task.

Almost the entire territory of the West Kazakhstan region 13 566,9 thousands of hectares - is located in an arid zone and is the scene of intense, comprehensive, multidirectional business activities of a society. Currently in the southern regions of the West Kazakhstan region (7 741,1 thousands of hectares) there is a General degradation of natural grasslands and can be observed the desertification of a land. In these areas natural grasslands are the main sources of feed for agricultural animals [Nasiyev, 2012; Nasiyev et al., 2015]. In this regard, restoration and improvement of biological potential of forage land and increase of their productivity is an urgent task. Despite the urgency and importance of the case in the southern districts of the region, till now the processes of degradation and desertification are not well explored, are not revealed with a sufficient certainty the specific causes of land degradation, are not defined and scientifically justified measures for prevention of further development of negative processes and phenomena, for the protection and rational use of natural resources.

Justification of choice of research areas.

Desertification and land degradation are caused mainly by human activities and climate change. Desertification directly affects 250 million of people. In addition, the livelihood and economic well-being of more than one billion people living in more than 110 countries is at the risk. The main economic consequences of desertification and land degradation are the reducing of agricultural yields and crops, a reduction of a livestock of cattle and camels, and a reduction in the growth of livestock, the stagnation of food and light industry and a sharp decline in revenue from the taxation of agriculture and processing industry. The total annual economic loss due to desertification is estimated at 93 billion tenge ($6.2 billion). The poor population suffers most from a land degradation.

Combating desertification is essential to ensure long-term productivity of drylands. This is the main purpose of the UN Convention to combat desertification (UNCCD), which entered into force in 1996 and has been ratified by 180 countries. The problem of desertification is very important for Kazakhstan, whose territory is almost entirely located in the arid zone. Main problems: salinization due to improper irrigation (33% of irrigated area); degradation of pastures (24 million ha of downed and badly downed pastures); the destruction of forest and grass vegetation cover, leading to loss of topsoil and of biological diversity (an area of saxaul has reduced from 10 to 5 million hectares), as well as the degradation of wetlands and coastal ecosystems of the Syrdarya, the region of the Balkhash lake and other water bodies. In this regard, the Republic of Kazakhstan ratified the UN Convention to combat desertification by adopting the corresponding law in 1997. [Chirkov et al., 2009; Rassomakhin et al., 2008; Bedarev et al., 1987].

Degradation of agricultural landscapes requires a systematic approach of studying the desertification processes and solving how to deal with them. An important element in such studies is to identify criteria of degradation and desertification, which have a clear tendency to change themselves due to the change of landscape, ecological and socio-economic conditions, and to establish of their quantitative characteristics, as

well as in-depth study of the dynamics of degradation and desertification. This necessitates a regional approach in the implementation of these studies. In addition, the restoration, improvementation of forage land and increasing of their productivity, the elimination of protein deficiency and bringing the crude protein content to 13 to 14%, and the exchange energy to 10-11 MJ per 1 kg of a dry weight is an urgent task. Despite the urgency and the importance of the case for planning of a further development of the economic complex in the southern districts of the region, the processes of degradation and desertification are still not well explored, there is no map of anthropogenic desertification, were not identified with a sufficient certainty the specific causes of land degradation, was not developed a forecast of their development for the next decade and were not defined scientifically based measures for prevention of a further development of negative processes and phenomena, for the protection and rational use of natural resources. Thus, the studies of a degradation processes and desertification are of practical interests of the economic complex of the region.

METHODS

A research was carried out in the West Kazakhstan Agrarian Technical University named after Zhangir Khan. (Republic of Kazakhstan, Uralsk).

The object of study is the grassland of a semi-desert zone of West Kazakhstan region. For the identification of the processes of desertification and degradation in breeding areas of Zhangala district were founded and described the soil cuts, in addition to this we studied vegetation in the transects, was identified a species composition of a vegetation, was measured the size of the plants, and was explored the projective cover of a vegetation cover of the grassland.

In the field transects were studied the indicators of a soil, was refined the genetic association of soils and was carried out soil samples for the futher conduction of agrophysical and agrochemical analyses.

The analyses of soil samples were conducted by conventional methods: mechanical composition of soil by method of N. A. Kachynski; the soil moisture by the gravimetric method; humus by method of I. V. Tyurin in the modification of the Central scientific research Institute of agrochemical service of agriculture (State Standard 26213-91); aqueous extract according to State Standard 264237 - 85, 26428 - 85; salt regime is according to State Standard 26425-85, absorption capacity, absorbed bases by method of B. Pfeffer; nitrate nitrogen by reagent of Lunga-Griss (disulfo-phenolic method); movable compounds of P_2O_5 by method of I. Machigin in the modification of a Central scientific research Institute of agrochemical service of agriculture (State Standard 26205 -91).

The degree of degradation of the soil cover of the grassland was defined on the base of approved environmental criteria of land evaluation [Resolution, 2007].

To study the techniques of restoration of the grassland of semi-desert zone of West Kazakhstan region were carried out field experiments in 3 farms (Janakazanskiy, Jangala and Brlik).

The morphological features of genetic horizons of the profile and agrochemical indicators of the plow layer of soil of tested sites are typical for the semi-desert zone of West Kazakhstan.

Agrotechnics of cultivation of perennial grasses were adopted for the West Kazakhstan region.

During field experiments surveys, observations of the onset of phenological phases and growth of perennial grasses were performed by the standard methods.

Photosynthetic activity of perennial grasses was studied by the standard technique [Nichiporovich et al., 1961].
Harvesting and accounting harvest were made by a continuous method with subsequent reduction to a standard humidity.

The statistical processing of a research results was made by variance analysis using computer programs [Dospekhov, 1985].

The chemical composition of plant mass was performed according to standard techniques.

RESULTS AND DISCUSSION

Modern state of soil cover of the grassland of semi-desert zones.

A progressive desertification of semi-desert zone of West Kazakhstan is due to the development of two main processes associated with human activities: degradation of soil and vegetation cover of the grassland.

For studying the soil cover in the territory of the grassland of Zhangala district were made 50 cuts with a depth of 1.5 meters with a selection of soil samples in horizon A+B1 with a capacity of 28.0 to 37.5 cm

According to the data of researches, the soil of the grassland does not have the same degree of degradation. So, in the sections № 1, 2, 3, 4, 5, 16, 17, 20, 21, 29, 30, 32, 33, 34, 41, 42, 43, 39, 47, 48, 49 and 50 the level of humus in the a horizon A with a capacity equal to 19.71-20,43 cm varies by transects within the limits of 1,33-1,39 %, in B1 horizon with a capacity equal to 16.37-16,88 cm - from 0.80 to 0.89 %.

If you compare the level of humus in all holes with a control section (were made in a virgin soil of Pyatimarsc`s rural district), so the level of humus in them is noticeably lower in the topsoil.

So, in the above mentioned sections the reduction of humus reserves in the soil profile of A+B1 compared with the initial profile was 10,20-18,65%. In the control and the above-mentioned sections of the level in the soil gross of nitrogen, total phosphorus ranges from 0.07 to 0.08 and 0.08 to 0.09 per cent respectively.

If in the control section the level of a mobile phosphorus was 1,58 %, then in the above mentioned sections, the rate of mobile phosphorus was at the level of 1,290-1,334%. Reducing in the level of a mobile phosphorus, compared with the average level of provision in these cuts was in the range of 10.67-14,67%. Data of analysis of the aqueous extract show mild salinity (amount of salts 0,205-0,243 %). The carbonate in the upper humus horizon was absent.

According to the data of analysis according to the evaluation criteria of soil cover the above mentioned sections have the first or weakest degree of degradation. The projective cover of the grassland with a valuable vegetation is at the level of 86,62-88,15%. Reducing in the level of a physical clay in comparison with the control is on the level of 6.81-9,34 %.

The soil cover of cuts № 8, 9, 25, 27, 28, 36, 37, 38, 40 45 studied by us on the territories of the grassland of Zhangala district according to the evaluation criteria is of the second or low level of degradation. According to the data of agrochemical analyses in the soil of these hayfields and pastures the reduction of reserves of humus in the profile A+B1 compared with the control profile was within 21,45-25,63 %. The decrease in the level of mobile phosphorus in comparison with a medium level in the sections was around of 21,67-27,33 %. In these cuts was an increase in the level of exchangeable sodium from the cation exchange capacity on the 11,42-of 12.43%. The amount of exchangeable bases in the soil samples was at the level of 12,19-12.75 mEq/100 g of soil. The mechanical composition of these cuts was an easy-loam, the volume weight was on the level of 1.40 g/cm3. The fractions of a mechanical composition of more than 0.01 mm were within 17,09-19,50 %. The projective cover of the grassland with a valuable vegetation was at the level of 63,62-65,44%.

According to the results of a field and laboratory researches it was established that on the territories of Zhangala district there is also the grassland with a strong third degree of degradation of the soil cover. Soils with a third degree of degradation were found mainly in a hayfields and pastures of Janakazanskiy and Zhanazholskiy rural districts (sections 6, 7, 44, and 46). In these soils with the capacity of a horizon A+B1 33,70-34,00 cm the reduction of reserves of humus in the profile A+B1 compared with the control profile was 41,77 to 44.68 %. The decrease in the level of a mobile phosphorus compared to the average concentration was on the level of 43,33-44,00 %. The increased level of an exchangeable sodium in the soil cover from the cation

exchange capacity was on the 17,11-17,28 %, with the reducing in the level of a physical clay in comparison with the control from 28,26 to 28,73 %.

According to the research data, on the territories of the grassland of Zhangala area the soil cover cuts № 10, 11, 12, 13, 14, 15, 16, 18, 19, 22, 23 24, 26, 31 and 35 are not degraded, and have the 0 degree of degradation. The reduction of reserves of humus in the profile A+B1 in these sections was in the range of 5.04-9,68% compare with the control profile. The decrease in the level of a mobile phosphorus, compare with an average availability in these cuts at the level of 8,67-to 9.67 %, while reducing the level of a physical clay from 4,60 to 4.93 %. In these cuts was marked an increase in the level of the exchangeable sodium from the cation exchange capacity on the 3.25 - 4.82 %. The projective cover of the grassland with the valuable vegetation is at the level of 96.38 - 97,34 %.

According to results of the studies there was revealed the area of degradation and desertification of the grassland of Zhangala area.

On January 1, 2016 in Zhangala region are available 357 268,0 ha of forage land, including 332 184,0 ha of pasture and 25 084,0 ha of hayfields.

Among the total area the feeding grounds of a strong third degree of degradation is at 21 133,2 hectares (5.92 per cent).

From the mentioned area 1 120,0 ha belong to the hayland and 20 013,2 ha belong to pastures. 53 759,0 ha or 15.05 % of the grassland are degraded with the second moderate degree, among them 1 056 ha of hayfields and 52 703,0 hectares of pastures.

The forage lands with signs of the first mild degree of the degradation are on the 164 148,2 ha.

The share of hayfields (17 156,6 ha) and pastures (146 991,6 ha) with the indicators of the first degree represent 45.95% of the total area of land. 227,6 ha (5 751,4 ha of hayfields and 112 476,2 ha of pastures) or 33,08 % of forage land do not have signs of degradation.

The data obtained in studies of vegetation of the grassland indicate a weak depth of distribution of the degradation processes, since the territories of the grassland area with the third strong degradation are 21 233,2 ha or 5.92 per cent of the whole area.

Assessment of the current state of the vegetation cover of a grassland.

According to the data of geobotanical research, carried out on the territory of Zhangala area the more degradation of the vegetation cover is observed in the pastures located in the southern part of the district. Pastures in the northern and central part of the district are less degraded. So, on the territory of meadows and pastures (transects № 1, 2, 4, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 29, 30, 31 and 35) the vegetation of pastures is more favourable. On meadows the projective cover of native vegetation is at the level of 28,76-of 32.08 %. The yield of herbage is at the level of 4.77-6,25 t/ha. The forage lands have a degree of reduction of feed stocks ranging from 1.95 to 2.13 %. The modern efficiency of fodder grounds is 87,82-92,20% of the potential. In these hayfields and pastures long-term secondary communitys are wide spread, and the trails of cattle are absent. According to the assessment criteria a vegetation cover of these grasslands has a zero degree, i.e., forage lands are not degraded.

The vegetation cover of pastures Pyatimarsciy rural district (transects No. 3 and 41), pastures of Mashtecsy rural district (transects No. 5, 27, 28 and 39), pastures of Birlik rural district (transects No. 32 and 33), pastures of Mendeshevsk rural district (transects No. 42, 43 and 47), grasslands (transects 34 and 48) and pastures of Kopzhasars rural district (transects No. 25, 49 and 50) according to the evaluation criteria have the first weak degree of degradation. The state of the vegetation of the above mentioned hayfields and pastures reflects the influence of the long-term secondary community. The projective cover of hayfields and pastures by the native land vegetation is within 19,15-20,00 %. The height of vegetation is at the level of 37,37-39,64 cm. The productivity of vegetation with the number of paths from 1 to 2 for every 20 m is 4,28-4,50 t/ha. The

results of calculations showed that at these sites the modern efficiency of fodder grounds is 84,21-85,55%, the reduction of forage reserves is 2,10-3,27 %.

On the transects 6, 7 and 45 which are located on the territory of the hayfields and pastures of the Zhanazholskiy`s rural district, pastures No. 8 and 9 of Janakazanskiy`s rural district, pasture No. 36 of Kopzhasarova rural district and pastures No. 37, 38 and 40 of Mashtecsayskiy`s rural district the projective cover of the grassland of native vegetation is 13,21-14,45 %, and the ruderal vegetation is 2 %. In these lands the number of cattle paths is 5-8 for every 20 m. The reduction of feed stocks in a modern productivity of 55,00-57,07% is 7,61-8,05 %. The productivity of hayfields and pastures at the height of the grass of 26,84-28,11 cm amounted to 2.74-3,14 t/ha. According to the evaluation criteria the specified feeding grounds have a second moderate degree of vegetation degradation. They contain long-term secondary plant communities.
As a result of geobotanical researches, in the southern part of Zhangala area the forage lands were established of a strong third degree of degradation of vegetation cover. It's basically feeding grounds Janakazanskiy`s rural district (transect No. 46) and Zhanazhol rural districts (transects No. 44). In these hayfields and pastures the projective cover of native vegetation is within 6,14-6,82 %. There was noted the spread of ruderal vegetation at the level of 3 %. The yield of herbage is reduced to 1.01-1,47 t/ha. Compared to other feeding grounds the rural districts have more trails of cattle, which indicates a greater load and a high level of trampling of farm pastures with animals. The modern productivity is reduced from the potential (33,06-39,85 %), forage reserves are reduced to 13.00-14,61 %. The ecosystem of these pastures is represented with short-derivative communities. The height of herbage is on the level of 15,22-17,86 cm.

According to the studies the current condition of vegetation forage land of Zhangala area was identified. On January 1, 2016 in Zhangala region was available 357 268,0 ha of forage land. On the territory of the district are wide spread the following feeding grounds: Ciaco-tyrsikov`s feeding grounds; Zelenopole`s grassland with a dominated logopaedia wormwood in Shagir and Burgun; the grassland with a predominance of Wildrye, Calamagrostis, Mya, Puccinellia; The grassland with a predominance of a soft stem grasses of a Smooth brome, Wheatgrass (Elymus trachycaulon), Puccinellia, Foxtail; the Brine feeding grounds with a predominance of a Kokpek; Ephemeral feeding grounds with a predominance of Bromus; the Brine feeding grounds with a predominance of Halocnémum, Suaeda, Quinoa warty, annual Thistle, Ceratocarpus, Atriplex tatarica; Modification of the vegetation; the grassland with a predominance of Wheatgrass; pastures in a variety of fields are dominated with a wormwood (Artemisia lercheana, Artemisia austrica, Artemisia monogyna); the feeding grounds of Artemisia pauciflora with a predominance of Artemisia vulgaris and Artemisia monogyna; the Fescue forage lands.

The feeding grounds of a strong third degree of degradation are represented on the area of 19 583,0 hectares (5,48 %). 42 852,1 ha or 12,00 % of a grassland are degraded with the second moderate degree.

On the 140 448,1 ha spread forage land with signs of the first weak degradation.

The share of meadows and pastures with the indicators of a first degree is 39,31% of the total area of land. 154 384,8 ha or 43,21 % of forage land do not have signs of degradation.

The data obtained in the course of geobotanical studies of a vegetation forage land, point to the weak penetration depth of the degradation processes, because the territorial district lands with the signs of a third strong degradation consist of only 19 583,0 ha or 5,48 % of the total area.

By the organization of different techniques aimed for the improvement of conditions of degraded grassland it is possible to achieve restoration of their bioproductivity.

Climatic conditions – temperature, precipitation, the annual temperature curve and a radiation are favourably promoting the restoration of the bio-resource potential of grassland of Zhangala area.

Factors of degradation and desertification of the grassland.

The analysis of the materials obtained in the course of a scientific research on the territories of the grassland of semi-desert zone of West Kazakhstan, has allowed allocating the following 3 classes of desertification in the degradation of a vegetation cover:

- Weak desertification;
- Moderate desertification;
- Strong desertification.

On the basis of the conducted research were identified the main factors contributing to desertification processes and degradation of the grassland. These are the natural and anthropogenic factors.

The natural factors include:

- The change of soil (the reduction of stocks of humus, mobile phosphorus content, physical clay and the increase of the content of exchangeable sodium);
- The growing influence of arid climate;

The anthropogenic factors can be ranked:

- As a result of a negative human impact;
- The population density is one of the leading factors of anthropogenic impact on the natural environment;
- Overload of pastures by cattle due to the increase in livestock population, failure to observe the optimal timing of grazing, failure to comply with anti-erosion and anti-deflation measures as in hayfields and in pasture sites
- Anthropogenic impact on the fragile arid ecosystems;
- Impact on the natural ecosystems of road and transport network, including highways and roads, the power lines manifests itself mainly in the form of irreversible locally-linear violations and have a marked tendency to extend their sphere of influence.

The depth and speed of degradation processes and desertification of the grassland of semi-desert zone of West Kazakhstan region is not significant.

However, with the organization of techniques improving the degraded grassland of semi-desert zone is possible to achieve restoration of their bioproductivity.

Selection of perennial grasses for restoration of bio-productive potential of degraded grassland.

When selecting perennial grasses for recovery of the bio-resource potential of the grassland of semi-desert zone, we took into account the experience of other academic institutions and best practices, as well as compatibility types and biological characteristics of the crops [Raczkowskaya, 1987; Shamsutdinov, 2011].

One of the important indicators of stability and adaptability of a species or ecotype of forage plants for extreme environmental conditions in arid zones is the survival of plants. The results show that in all studied farms the dynamics of a plant density of perennial grasses and their safety depended on the species composition of grass stands.

During the research the perennial grasses of the second year of vegetation formed a complete 1 mowing in hay and pasture grass stands.

According to the data of studies in the first farm (BRLIC) the highest yield of green mass was in the mixed crops of Yellow sweet clover (Melilotus officinalis) and Wheatgrass (Agropyron) (3,85 t/ha). The yield of green mass of Clover was at the level of 3,25 t/ha.

A Wheatgrass provided the collection of green mass to 2.42 t/ha (table 1).

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Table – 1. Productivity of perennial grasses of a hay use of the second year of vegetation, t/ha

Name of perennial grasses and grass mixtures	Green mass			Dry mass		
	Farm			Farm		
	1	2	3	1	2	3
Yellow sweet clover	3,25	2,10	1,94	0,77	0,50	0,47
Wheatgrass	2,42	2,01	1,81	0,73	0,61	0,56
Yellow sweet clover+ Wheatgrass	3,85	2,40	2,21	1,03	0,64	0,60
SMD_{05}, t/ha	0,26	0,28	0,23	-	-	-

A collection of a dry mass of the herbage of perennial grasses of the second year of vegetation was 0,73-1,03 t/ha. The common crop of Clover and Wheatgrass was different in the collection of a dry mass. In the second (Jangala) and third (Janakazanskiy) farms were received a similar results on the dynamics of the productivity of perennial grasses of a hay use as in the 1 farm. In the first hay harvest, the yield of pasture herbage was lower in comparison with crops of perennial grasses of a hay use. Thus from the pasture crops the highest yielding was the Wheatgrass. So, in the 1 farm a collection of a green mass of crops of Wheatgrass was at the level of 2.54 t/ha, and seeds of Eurotia (Ceratoides Reserve) and chaste tree (Agni casti fructs) are respectively of 0.78 and 0.51 t/ha. A collection of dry mass of the herbage of perennial grasses of the second year of vegetation was at 0.30-0.77 t/ha. The crops of Wheatgrass were different in the collection of a dry weigh. In the second and the third farms we obtained similar results on the dynamics of the productivity of perennial grasses of a pasture use as in the first farm (table 2).

Table – 2. Productivity of perennial grasses of a pasture use of the second year of vegetation, t/ha

Name of perennial grasses	Green mass			Dry mass		
	Farm			Farm		
	1	2	3	1	2	3
Eurotia	0,78	0,58	0,47	0,47	0,35	0,29
Wheatgrass	2,54	1,94	1,78	0,77	0,60	0,55
Chaste tree	0,51	0,40	0,39	0,30	0,24	0,23
SMD_{05}, t/ha	0,19	0,18	0,14	-	-	-

Calculations of a nutritional value of products received on the basis of the data of the chemical analysis shows in the 1 farm the high productivity of the mixed crops of Yellow sweet clover and Wheatgrass (0,66 t/ha of fodder units, 0,13 t/ha of crude protein and 6,23 GJ/ha of exchange energy). These herbages of perennial grasses of the second year of vegetation in the first mowing showed the identical results for feed value in the 2nd and 3rd farms (table 3).

Table – 3. Feeding value of perennial grasses of a hay use of the second year of vegetation.

Name of perennial grasses and grass mixtures	Feed unit, t/ha			Crude protein, t/ha			The exchange energy, GJ/ha		
	Farm			Farm			Farm		
	1	2	3	1	2	3	1	2	3
Yellow sweet clover	0,66	0,43	0,40	0,13	0,08	0,07	6,23	4,08	3,79
Wheatgrass	0,65	0,50	0,48	0,11	0,09	0,08	5,88	4,87	4,42
Yellow sweet clover+Wheatgrass	0,87	0,53	0,49	0,17	0,10	0,09	7,98	4,95	4,59

In the 1st farm among the studied perennial grasses for rangeland use in the first mowing one of the most productive turned out to be Wheatgrass (0,69 t/ha feed units, 0,12 t/ha of crude protein and 4,40 GJ/ha of exchange energy) (table 4).

Table – 4. Feeding value of perennial grasses of a pasture use of the second year of vegetation

Name of perennial grasses	Feed unit, t/ha			Crude protein, t/ha			The exchange energy, GJ/ha		
	Farm			Farm			Farm		
	1	2	3	1	2	3	1	2	3
Eurotia	0,37	0,27	0,22	0,07	0,05	0,04	3,39	2,53	2,06
Wheatgrass	0,69	0,53	0,49	0,12	0,09	0,08	6,22	4,80	4,40
Chaste tree	0,24	0,18	0,18	0,04	0,03	0,03	2,14	1,68	1,61

In the experiments the lowest productivity was shown in the crops of Chaste tree (0,24 t/ha of fodder units, 0,04 t/ha of crude protein and 2,14 GJ/ha of exchange energy). An intermediate position in terms of productivity and feed value is in the crops of Eurotia (0,37 t/ha feed units, 0,07 t/ha of crude protein and 3,39 GJ/ha of exchange energy).These herbages of perennial grasses of the second year of vegetation of a pasture use in the first hay showed identical results for feed value and in the 2nd and 3rd farms.

CONCLUSION

The data obtained during the survey indicate a slight depth of the distribution of degradation processes in the grassland of semi-desert zones. On the territories of the grassland the degradation processes have different speeds. The most areas of the grassland of semi-desert zone (Northern part of Zhangala area) are characterized by the weak rate of degradation. The higher rate of degradation is observed in the pastures of the southern part of Zhangala area (Sanaksarsky rural district), where the salinization and sodification of soils are largely developed.According to studies, the higher degradation rate of forage land contributes to a greater degree in the strengthening of arid climate.

On the basis of the research the main factors contributing to desertification processes and degradation of the grassland were identified. These are the natural and anthropogenic factors.

A single-species and mixtures of perennial grasses are important to be used for the restoration of bio-resource potential of the grassland in the semi-desert zones. In the forage land of a hay use in the semi-desert zone of West Kazakhstan the highest productivity of different grass mixtures were found in Yellow sweet clover and Wheatgrass (0,60-1,03 t/ha of dry weigh, 0,49-0,87 t/ha of fodder units and 0,09-0,17 t/ha of crude protein). Among the perennial grasses of a pasture use it is economically beneficial to use the single-species crops of Wheatgrass (0.55 to 0.77 t/ha of dry weigh, 0,49 to 0,69 t/ha of fodder units and 0,08-0,12 t/ha of crude protein).

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