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ТҮЙІН

Қазақстанның әр-түрлі табиғи-экономикалық аудандарында шегірткелердің 270 түрлері тараған. Олардың ішінде ауыл шаруашылығы танаптарына 15-20 түрі өте қауіпті. Таралу қарқыны мен зияндылығы жқнінен азаттық шегіртке мен (*Locusta migratoria L.*) итальяндық прус (*Calliptamus italicus L.*) ерекшеленеді.

Зерттеу нәтижелері бойынша Батыс Қазақстан облысының жартылай шөлейт аймағында шегірткелерге қолданылатын заманауи дәрумендердің биологиялық тиімділігі анықталды.

РЕЗЮМЕ

В различных природно-экономических зонах Казахстана обитают около 270 видов саранчовых насекомых. Наибольшую опасность сельскохозяйственным угодьям представляют 15-20 видов. Среди них по степени распространения и уровню вредоносности особо опасными видами являются азиатская (перелетная) саранча (*Locusta migratoria L.*) и итальянский прус (*Calliptamus italicus L.*).

В результате исследований получены данные о биологической эффективности современных препаратов, применяемых против саранчовых в условиях полупустынной зоны Западно-Казахстанской области.

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Nasiyev B.N., doctor of agricultural sciences, professor, corresponding member of NAS RK,
Zhanatalapov N.Zh., master of agricultural sciences,
Bekkaliyev A.K., master of agricultural sciences

INFLUENCE OF MODES OF GRAZING ON VEGETATIVE AND SOIL COVERS OF PASTURES

Abstract

The researches established the expediency of moderated (65-75% browsing) use of pastures. The change of floristic structure and efficiency, and also deterioration of agrochemical and agrophysical indicators of pastures soil cover was noted at the intensive use of pastures.

Keywords: *pastures, monitoring, browsing, floristic structure, soil cover, efficiency.*

In the XX century arid ecosystems of Eurasia underwent intensive anthropogenous influence. In this connection, their efficiency decreased, valuable types of fodder plants disappeared from herbage, vulnerable ecosystems are exposed to degradation. Today there are 187 million hectares of pastures in the republic from which about 81 million hectares are used, thus, among the used pastures - 26 million hectares are degraded - generally these are pastures lying near the settlements [1, 2].

Numerous scientific searches and development of scientific institutions of agricultural and biological profile show that in order to support the ability of pastures to continuous seed and vegetative renewal and reproduction of necessary level of fodder resources, it is necessary to exploit them within ecological imperative. The first ecological precept of rational use of pastures is the observance of compliance principle of their natural capacity to the number of grazing animals. The long-term scientific researches carried out in the second half of the 20th century by scientists of different countries show that it is possible to withdraw from 25 up to 75% of elevated vegetable weight in various natural zones without prejudice to the subsequent efficiency of pastures [3, 4, 5, 6].

Thus, the main issues of ecologically steady maintaining of pasturable economy is the amount of withdrawal and frequency of herbage browsing. It is possible to withdraw 65-75% of annual gain of plants without prejudice to the renewal processes. Alienation of annual gain at this level creates natural favorable conditions for vegetative and seed renewal of plants, creates prerequisites for annual reproduction of vegetable weight and excludes possibility of ecological communications violation in vegetable community and thereof provides stability of all pasturable ecosystem.

The work is performed within the program of grant financing of Committee of science of MES RK on "Assessment of state and development of adaptive technologies of rational use of semidesertic pasturable ecosystems" project in 2015-2017 years.

The researches purpose is the development of adaptive technologies of rational use of natural pasturable ecosystems providing accelerated restoration and increase of their efficiency, improvement of human's environment parameters in semidesertic zone of Kazakhstan.

Accounting of productivity and regime supervision of changes of specific structure, cenopopulation structure of pasturable ecosystems by the seasons, definition of forage capacity of pastures were carried out on the pastures of semidesertic zone of West Kazakhsan region (Zhangalinsky area) for the solution of objectives.

The transects of 100x50 m in size were established for the study of year gain alienation influence of elevated weight in the course of gazing on zonal typical pastures. The gazing was carried out at the beginning of spring, middle of spring, end of spring, in summer and in autumn. Schemes of herbage browsing: 1. Full 100% browsing of pasturable plants year gain; 2. Moderate browsing – 65-75% of pasturable plants year gain. Full (100% of year gain) and moderated (65-75% of year gain) browsing was carried out to all terms of browsing: at the beginning, middle, end of spring, in summer and in autumn.

The following accounts and supervision were carried out on the experiments on study the influence of gazing on pasturable ecosystems: 1) phenological supervision; 2) change of specific composition of pastures herbage; 3) age structure of cenopopulation; 4) change of fodder weight productivity by years and seasons;

Grazing directly or through the soil influences composition of herbage, especially intensive and unregulated grazing. Its direct influence is that it suppresses one species of herbs, promotes growth of others. The cattle grazing significantly influences composition of herbage: reduces abundance of some high-stem types and promotes increase in quantity of cereals. The excessive grazing leads to herbage opening and domination of inedible and ground level leafy herbs [7, 8, 9].

Researches on the study of influences of pasture modes on the dynamics of pasturable ecosystems in 2015-2017 were carried on the territories of "Daulet" farm of S. Mendeshovsky rural district on the established transects on three sites with different intensity of pasture: 100% full drain (strong loading), 65-75% moderate drain (average loading) and 30-40% weak drain (weak loading).

Floristic structure of test sites. Weak mode of pasture is observed (30-40% drain) on the site of pastures which was under intensive influence of animals for the last 13 years earlier the. Typical cereals (*Stipa*, *Festuca* and others) are absent here, *Agropyron desertorum* is presented by only several species. Floristic variety is made here by 9 types (background), many representatives of forbs were marked out among them. 11 types were the most widespread (background) plants on the site with moderate pasture. Long-term cereals - *Stipa capillata* are typical here, *Agropyron desertorum*, *Leymus ramosus*. On the site with full 100% pasture, specific variety of plants is the lowest - 8 types (background) which are presented by generally low-eaten and weed types (*Artemisia austriaca*, *Alyssum turkestanicum*, *Chenopodium album*, *Ceratocarpus arenarius*, etc.). Ephemeral plants were noted on all three sites during spring period.

Change of structure of test sites vegetation under the influence of pasture. On all three sites during spring period (end of April), along with ephemeral plants, *Artemisia lerchiana* which in process of strengthening of pasturable loading increases participation in composition of herbage acts as the main dominants. So, at 100% of occurrence on all sites, the number of bushes of *Artemisia lerchiana* on pasture with full loading are almost three times higher than on the site with weak mode of pasture. Respectively, projective covering of wormwoods on the site with full loading (100% pasture) is twice higher (45%) than on two other sites (22%). At the same time, it should be noted that general projective covering of plants on phytocenoses decreases when strengthening loading: 87% - on the site with weak drain, 72% - at moderate loading and 61% at full that it is possible to see visually.

The mode of use is reflected as well on abundance of ephemeral plants. Annual cereals-ephemeral plants of *Poa bulbosa*, as well as wormwood, increase participation in the structure of phytocenoses of pastures in the process of loading strengthening. For 3 years at the moderate mode of use, the number of *Poa bulbosa* has averaged 1,92 species/0,25 m² against 5,26 species/0,25 m² at the full mode of use. From other species increasing participation in the process of loading strengthening it is possible to note *Ceratocarpus arenarius* and *Tanacetum achilleifolium* which number on pasture with intensive use is 4-5 times more than on other test sites.

Festuca valesiaca reacts to the strengthening of loading negatively. The direct dependence of extent of participation in *Festuca valesiaca* herbage on the size of loadings is most brightly expressed. The number and occurrence of this species decreases in the process of loadings strengthening. *Festuca valesiaca* at weak and moderate mode of use has extent of participation from 1,75 to 3,56, and at the full mode of use this indicator is 0.

In the middle of June two layers are allocated for pasture with moderate loading: top - up to 37-48 cm, presented by dominant *Stipa capillata* and less often *Agropyron desertorum* and lower - up to 16-19 cm, formed by *Artemisia lerchiana*, with projective covering of 40%. On the site with weak mode of pasture, *Artemisia lerchiana* and *Artemisia austriaca* form together with *Kochia prostrata* one-layered community with the height to 42-48 cm, and their total projective covering increases up to 47% here. Ephemeral plants in all sites by this period have dropped out from herbage composition. In autumn (end of September), on the site with moderate use, general projective covering has decreased up to 63% due to dumping of some part of wormwood leaves. On the site with full use it has made 43%, and, 40% were the share of *Artemisia lerchiana* and *Artemisia austriaca*. Number of vegetative individuals of *Artemisia lerchiana* and *Artemisia austriaca* by the end of vegetative period on all three sites has decreased almost twice.

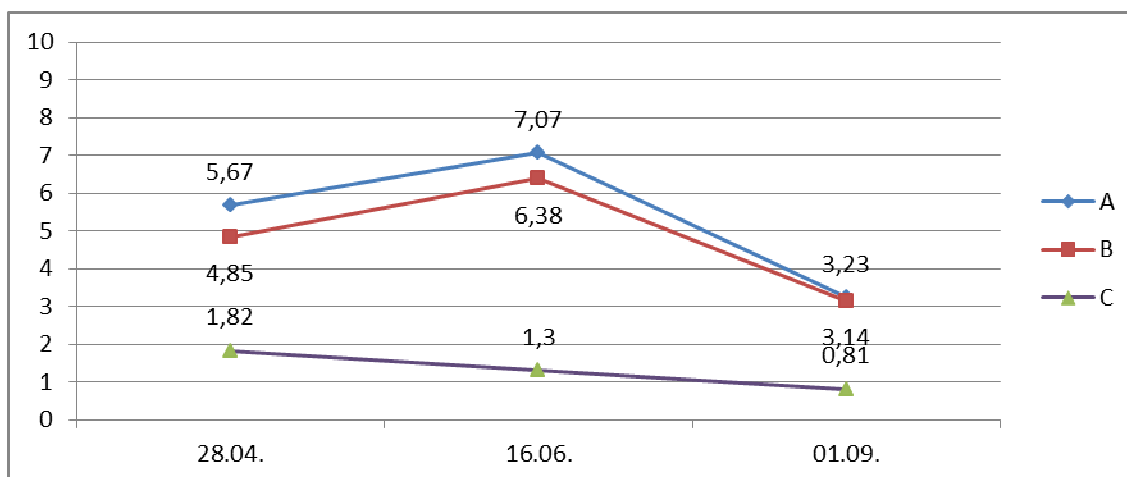
For *Kochia prostrata* direct dependence of extent of participation in addition of pastures herbage depending on intensity of pasture was noted. With quite high number and occurrence on moderate pasture it has been presented by single copies on a pasture with full loading.

Changes of production of communities under the influence of pasture. Agricultural animals are capable to use environment resources so strongly that can lead to considerable reorganizations in vegetable community, sometimes such communities practically become unsuitable for economic use and are not subject to restoration [20, 21, 22].

According to the data of researches on average for 3 years (2015-2017) the maximum production of phytoweight on a pasture with full loading has been noted at the end of April during mass development of ephemeral plants and reached 1,82 c/hectare. The major role as a part of production was played by *Poa bulbosa*. Further, decrease in production to 1,30 c/hectare and up to 0,81 c/hectare was observed here in summer and autumn (Figure 1).

On the site with weak mode of pasture and on pasture with moderate loading where ephemeral plants do not play significant role, the maximum of production was noted in the middle of June, 7,07 and 6,38 c/hectare respectively. Efficiency of sites with moderate and weak modes of pasture during spring period was 4,85-5,67 c/hectare.

By the end of summer on the sites with moderate and weak use there is a decrease in production of vegetation to the minimum values that is connected with loss from structure of vegetation of forbs representatives and drying of cereals. In autumn, efficiency of the specified sites was 3,14-3,23 c/hectare. In spring, cereals form the largest weight on the pasture with full pasture, and the smallest - on the site with weak mode of pasture.



Modes of use of pastures: a – weak 30-40% b – moderated 65-75% c – full 100%
Harvesting terms: 28.04; 16.06; 01.09.

Figure 1 – Dynamics of elevated phytoweight depending on the pasture modes an average for 2015-2017, c/hectare

To the middle of the first month of summer, phytomass of cereals in general share of production on these two sites comes to naught as only annual cereals which completely dry by this time participated in production synthesis.

On a pasture with moderate pasture, the main role in production synthesis of phytomass of pasture during summer period is played by long-term cereals. They almost completely dry by the end of summer. Here, from the beginning of autumn rains and the beginning of secondary vegetation of cereals, the small gain of green material was noted.

Only forbs participate in the synthesis of summer production of the site with weak mode of use (as well as on the site with full use). Summer maximum of its production here is almost completely defined by the development of steppe one which by the end of summer decreases almost twice. In autumn, basic mass of forbs production fell on *Artemisia lerchiana* and *Artemisia austriaca*. On the site of moderate pasture, production of forbs for all vegetative period was at the level of 6,05 c/hectare in spring, 6,85 c/hectare in summer and 3,25 c/hectare in autumn.

Influence of pasturable load of soil cover indicators. It is known that excess of pasturable loading negatively affects properties of soil. Soils of degraded pastures are characterized by the increased density and a little lowered indicators of structurization [23, 24].

According to the data of researches in 2015-2017, the content of humus in light brown soils of semidesertic zone also depends on the mode of use of pasturable ecosystems. Close dependence of reserves of plants biomass on physical properties of experimental sites soils was also observed in the studied semidesertic ecosystems. For 3 years at weak pasture of animals, the content of humus on the horizon of 0-10 cm of light brown soils has averaged 1,41%, at the increase in load of pasturable phytocenosis there is a decrease in the content of humus to 1,33% (at moderate mode) and 0,88% at 100% full drain. Similar data were obtained in the analysis of soil samples selected in a layer of 10-20 cm. At the same time, with increase in loading on pastures there was a decrease of humus content in underlying layers of soil from 0,68 to 0,90%.

In soils of semidesertic zone, one of the limiting elements of soil fertility is phosphorus content. On average for 3 years, the results of chemical analysis of soil samples selected in the layers of 0-10 and 10-20 cm on 3 types of pastures have shown decrease tendencies of mobile phosphorus content on light brown soils at the increase in load of pastures. So, at weak mode of pasture, the content of mobile phosphorus in soil on the layers of 0-10 and 10-20 cm was 1,37 mg/100 gr and 1,40 mg/100 gr respectively. At moderate loading up to 65-75%, the content of mobile phosphorus in comparison with weak mode has decreased on the layers of 0-10 and 10-20 cm by 0,16 mg/100 and 0,17 mg/100 gr respectively and was 1,20 mg/100 gr and 1,24 mg/100 gr. Further increase in loading up to 100% of drain lowers the content of mobile phosphorus by 0,53 mg/100 gr in layers of soil of 0-10 cm and 10-20 cm.

On the sites of pasture depending on pasture mode, density indicator in a layer of 0-10 cm is 1,35-1,45 g/cm³. Density of soil increases in the process of strengthening of pasturable loading. The highest rate of density of soil in a layer of 0-10 cm was noted at full 100% pasture (1,45 g/cm³). Dynamics of density of soil differs depending on depth.

The most considerable changes were noted in the top layers (0-5 cm). In lower layer of 10-20 cm, density of soil remains practically at the same level, except for option of 100% of load of pastures.

On average for the years of researches (2015-2017) in a layer of soil of 0-10 cm, the content of valuable structural units in soil on the sites of pastures with weak and moderated modes of pasture fluctuated within 82,47-85,73%. In a layer of soil of 10-20 cm, this indicator on the stated sites a little above fluctuates within 84,63-88,33%. However, on the last site of pastures with the full mode of drain, the content of valuable structural units in soil falls up to 73,63% in a layer of 0-10 cm and up to 65,83% in a layer of 10-20 cm.

Deterioration in physical chemical properties has in turn led to the increase in contents of exchange sodium in soil. If in a layer of soil of 0-10 cm of pastures with weak mode of use, the content of exchange sodium was 0,95 mg.eq/100gr, then with change of mode of pasturage to the increase of drain of phytocenoses up to 65-75%, the content of exchange sodium increases to 1,42 mg.eq/100 gr, and when using 100% drain up to 2,13 mg.eq/100 gr. Similar changes on the content of exchange sodium in soil were noted by us in the analysis of tests which were selected in a layer of 10-20 cm.

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ТҮЙІН

Зерттеулер жайылымдарды бірқалыпты (65-75% көлемінде малға жаю) пайдаланудың тиімділігін анықтады. Жайылымдарды қарқынды (100% көлемінде малға жаю) пайдаланған жағдайда олардың өнімділігінің өзгеруі байқалды, сонымен қатар жайылымның топырақ жамылғысының агрохимиялық және агрофизикалық көрсеткіштері нашарлады.

РЕЗЮМЕ

Исследованиями установлена целесообразность умеренного (65-75% стравливание) использования пастбищ. При интенсивном использовании пастбищ отмечено изменение флористического состава и продуктивности, а также ухудшение агрохимических и агрофизических показателей почвенного покрова пастбищ.