ТҮЙІН

Табиғи мал азықтық алқаптардың болуы, етті мал шаруашылығының аз шығынды жайылымдық технологиясы Қазақстанның әлемдік нарықта маңызды және бәсекеге қабілетті ойыншы ретінде қалыптасуы үшін әлеует жасайды. Осыған байланысты, табиғи жайылымдардың өнімділігін арттыру басымды міндет болып табылады. Мақалада жартылай шөлейт аймақтың мал азықтық алқаптарының өсімдік жамылғысының күйзелуін зерттеу нәтижелері қарастырылады. Геоботаникалық зерттеулер көрсеткендей, шөлейттенудің басқа процестерінен өсімдік жамылғысының күйзелуінің айқын басым болуы Батыс Қазақстан облысының Бөкей ордасы және Жаңақала аудандарының азықтық алқаптарына тән. Батыс Қазақстанның жартылай шөлейтті аймағының мал азықтық алқаптарының аумақтарында жүргізілген ғылыми зерттеулер барысында алынған материалдарды талдау өсімдік жамылғысының күйзелуі бойынша шөлейттенудің 3-сыныбын бөлуге мүмкіндік берді. Жаңақала ауданында Жаңақазан ауылдық округінің жайылымдарының өсімдіктер жамылғысы неғұрлым күйзелген, қалған аумақтарда күйзелу 1 және 2-дәрежеге ие.

РЕЗЮМЕ

Наличие естественных кормовых угодий, малозатратная пастбищная технология мясного скотоводства создает потенциал для становления Казахстана как значимого и конкурентоспособного игрока на мировом рынке. В связи с этим, повышение продуктивности природных пастбищ является задачей приоритетной. В статье рассматриваются результаты исследований по изучению деградации растительного покрова кормовых угодий полупустынной зоны. Как показывают данные геоботанических исследований, явное преобладание деградации растительного покрова над другими процессами опустынивания, характерно для кормовых угодий Бокейурдинского и Жангалинского районов Западно-Казахстанской области. Анализ материалов, полученных в ходе проведенных научных исследований на территорий кормовых угодий полупустынной зоны Западного Казахстана, позволил выделить 3 классы опустынивания по деградации растительного покрова. В Жангалинском районе наиболее деградированы растительность и почвенный покров пастбищ Жанаказанского сельского округа, на остальной территории деградация имеет 1 и 2 степени.

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ELEMENTS OF THE TECHNOLOGY OF CULTIVATION OF SUDANESE GRASS IN THE DRY STEPPE ZONE

Abstact

One of the requirements of modern animal husbandry is the uninterrupted supply of agricultural animals with an increasing number of full-fledged feed. An important factor in increasing the efficiency of crop diversification in Western Kazakhstan and reducing the dependence of crop productivity on weather conditions is the expansion of crops that are most adapted to unstable moisture. In recent years, in Western Kazakhstan, due to the diversification of agricultural production, commodity producers have widely begun to cultivate drought-resistant Sudanese grass. High ecological plasticity and otavnost, the ability to form a good mass during the summer depression of perennial grasses, the ability to sow in several terms and excellent eating of green mass by all herbivores, put it in a number of indispensable components of the green conveyor. The value of Sudan grass is also invaluable as a universal crop that is equally suitable for making hay, haylage, grass flour and silage, as well as for using green mass for feeding and grazing. The article presents research data on the development of adaptive technologies for cultivation of Sudanese grass in the dry steppe zone of Western Kazakhstan. Sudan grass – as a drought-resistant and plastic crop has a great appeal among farmers. One of the important points of its technology is the height of the cut of the mowing mass. According to research data, in Western Kazakhstan, to increase productivity and quality, it is advisable to mow the green mass of Sudanese grass at the level of 5 cm. In studies under this regime, the average yield of green mass of Sudanese grass for 3 years was 118.83 c/ha. With the productivity of feed units of 23.15 c/ha, protein collection was at the level of 2.16 c/ha. The cut height of 5 cm is optimal for growing Sudanese grass after harvesting. In General, the implementation of the obtained scientific data will allow

domestic farmers to enter new markets with high-quality products,which will raise the country's rating in the world.

Keywords: *Sudan grass, adaptive technology, cut height, yield, quality*

The solution to the problem of increasing the production of meat and milk can be provided by the accelerated development of feed production. To do this, it is necessary to review the structure of raw materials sources and the production technology of energy-saturated high-protein feed. To bring feed production to a higher level, it is necessary to further diversify crop production (increase in the structure of high-protein forage crops), increase productivity and eliminate protein deficiency by bringing the crude protein content to 13-14%, and exchange energy to 10-11 MJ per 1 kg of dry matter using adaptive and innovative technologies.

In this regard, in the near future, according to the program for the development of the agro-industrial complex until 2017-2021 as a whole, the crop industry will continue to diversify agricultural crops by replacing part of the wheat area with more popular crops (oilseeds, barley, corn, forage crops) [1].

An important factor in increasing the efficiency of crop diversification in Western Kazakhstan and reducing the dependence of crop productivity on weather conditions is the expansion of crops that are most adapted to unstable moisture, such as chickpeas, Sudan grass, sorghum, corn and sunflower.

In recent years, in Western Kazakhstan, due to the diversification of agricultural production, commodity producers have widely begun to cultivate drought-resistant Sudanese grass. High environmental plasticity and otavnost, the ability to form a good mass during the summer depression of perennial grasses, the ability to sow in several terms and excellent eating of green mass by all herbivores, put it in a number of indispensable components of the green conveyor. The value of Sudan grass is also invaluable as a universal crop that is equally suitable for making hay, haylage, grass flour and silage, as well as for using green mass for feeding and grazing. Sudanese grass after mowing or rational bleed quickly grows and within a day gives an increase of 5-10 cm. Due to its high quality, the Sudanese grass can be used in haymaking and pasture modes and in a green conveyor on field lands. The productivity of Sudanese grass both in the main mowing and Otava is largely determined by the mowing time, and the question of the period of use of Sudanese grass in the literature is interpreted very differently. Many authors recommend cleaning the Sudan grass for green food at the beginning of broom sweeping [9, 10]. Some researchers are inclined to recommend harvesting Sudanese grass for green food in the phase of complete tubulation [2]. The nature of the growth of Sudanese grass is greatly influenced by the height of the cut of plants during harvesting. Most researchers recommend mowing at a height of 6-8 cm [3, 4].

The aim of the research is to study the dependence of the yield of Sudanese grass on the height of the cut of grass stands.

To achieve this goal, a field experiment was conducted in 2018-2020 at the experimental field of the Zhangir Khan wkatu the project**:** "Development of adaptive technologies of forage and oil-bearing crops cultivation in relation to the conditions of West Kazakhstan".

The objects of research are single-species crops of Sudanese grass.

Calculation of plants standing density on shoots and before harvesting allows to determine the influence of the studied factor on conditions of shoots and loss of plants during vegetation.

Study of growth dynamics allows to define the period of the most intensive growth.

Photosynthetic activity of cultures is studied by the standard technique [5]. Photosynthetic activity characterize productional processes of crops. The determination of the main photosynthetic parameters in the phases of crop development.

One leaf area was calculated by Anikeeva-Kutuzov folmula: LA= 2/3p*h, where p - width of leaf, cm; h - length of leaf, cm.

It is possible to determine influence of term and height of main hay crop on harvest of aftermath and general efficiency of culture by carrying out observation of recovery ability of Sudan grass.

Besides special researches for correct explanation of results of field experiments, regular visual observations of condition of crops in the same hours are made.

Determination of their botanical structure is carried out for the determination of qualitative composition of herbages.

The analysis of harvest structure allows to study influence of conditions of cultivation and methods of agrotechnology on features of harvest forage formation and oil-bearing crops, serves as indirect assessment of production quality.

Harvesting and accounting of harvest is carried out by continuous method.

Laboratory methods:

Chemical composition and nutritiousness of vegetable mass of forage crops and silage mass of sunflower by standard techniques:

general nitrogen and crude protein point 3 State Standard 13496.4-93;

crude cellulose by State Standard 13496.2–91;

crude fat according by State Standard 13496.15–97;

crude ashes by weight method by State Standard 26226–95;

nitrogen-free extract by subtraction from 100% of the contents of crude cellulose, crude ashes, crude fat and crude protein; phosphorus by photometric method according to State Standard 26657–97;

potassium by ardent and photometric method after wet combustion of State Standard 30504-97;

calcium by titrimetric method by State Standard 26570–95;

content of solid in green material by drying of hinge plate in a drying cabinet at the temperature of 105^0C to constant weight.

Methods of assessment of researches results:

Determination of economic efficiency adaptive technologies of forage and oil-bearing crops cultivation is carried out by calculation standard method based on flow charts.

Determination of productivity, quality of production and economic, biopower assessment will allow to determine efficiency of adaptive technologies of forage and oil-bearing crops cultivation.

Biopower assessment of the studied methods is carried out according to the methodical recommendations [6].

Now, one of the most widespread and perfect methods of statistical data processing of productivity in field experiments is dispersive analysis. In researches, statistical processing of researches results by the method of dispersive analysis is carried out with the use of computer programs [7].

Agricultural engineering: In the experiments, the zoned variety of Sudan grass Brodskaya 2 was used. the seeding rate is recommended for the dry-steppe zone.

Due to the biological characteristics of Sudan grass, tillering does not weaken throughout the growing season, which is one of the distinguishing properties of this crop in contrast to other annual fodder grasses.

In addition to the biological peculiarity to tillering, the formation of shoots and their number are noticeably influenced by environmental conditions (temperature, humidity) and applied agricultural technology, as well as the frequency and height of mowing. Too low mowing, up to 2-4 cm, is undesirable, since Sudan grass stores plastic substances in the tillering node and in the first internode. Therefore, with low mowing, together with the first internode, the supply of plastic substances is alienated, which, of course, inhibits subsequent growth. The growth of Sudan grass can occur in three ways: due to the formation of new shoots from gemma located in the axil of the leaves of the first internodes preserved after the cut; growth of shoots, the growth point of which was affected during mowing. Of the three named, the first path should be considered the main one - shoots arising from the tillering node account for up to 80%. Thus, the productivity of Sudan grass is significantly influenced by the height of mowing. This issue has not been studied in the conditions of dry steppe zone of West Kazakhstan. In this regard, we studied the following height of mowing in cm: 5, 10, 15.

As our research shows, the productivity of Sudan grass at different heights of mowing depends on the number of shoots with renewal gemma. With an increase in the height of mowing, the number of shoots having renewal gemma decreases, which also affects the intensity of growth.

In terms of years, the highest productivity of Sudan grass in the studies of cut height was determined in 2019, and the lowest in 2018. In 1 mowing in productivity, the intermediate position was occupied by crops of 2020.

In our research, with an increase in the height of mowing, the timing of mowing ripeness decreased, and the productivity of Sudan grass accordingly decreased. According to research data, on average for 2018-2020, the maximum yield of the green mass of Sudan grass was obtained when harvesting at the level of 5 cm 82.88 c/ha. Increasing the height of mowing to 10 cm reduces the yield of green mass by 14.67% (70.72 c/ha). When harvesting Sudan grass in a 15 cm mowing mode, the yield of green mass was 57.49 c/ha, which is the minimum of all options studied.

On average, in 2018-2020, the highest collection of dry mass of Sudan grass is provided with a green mass mowing height of 5 cm - 18.71 c/ha. When harvesting mowing mass at the level of 10 and 15 cm, there was a decrease in the collection of dry mass of Sudan grass to 15.99 and 12.93 c/ha (Table 1).

Table 1 – Productivity and feed value of Sudan grass of 1 mowing depending on the height of mowing on average for 2018-2020

Indication	Height of mowing, cm		
	5	10	15
Green mass, c/ha	82,88	70,72	57,49
Dry weight, c/ha	18,71	15,99	12,94
Feed units, c/ha	15,34	13,11	10,63
Digestible protein, c/ha	1,50	1,29	1,05
Provision of feed units with protein, g	97,78	98,40	98,77
Exchange energy, GJ/ha	18,67	15,96	12,93
LSD_{05} dry mass – 1,17 c/ha (2018); 1,73 c/ha (2019); 1,60 c/ha (2020)			

As energy-protein assessment data show, on average, over 3 years of research in the relationship of feed value, the most effective was harvesting the draft mass at the level of 5 cm. when harvesting Sudan grass at the level of 5 cm of mowing mass, 15,34 c/ha of feed units, 1.50 c/ha of digestible protein and 18.67 GJ/ha of exchange energy was obtained, while the supply of feed units with protein was 97.78 g. When harvesting mowing mass of Sudan grass at the level of 15 cm, a decrease in the productivity of this crop was noted. With this mowing mode, the yield from 1 ha of feed units was 10.63 c/ha, digestible protein 1.05 c/ha at an exchange energy collection of 12.93 GJ/ha. The intermediate position for energy-protein value is occupied by a mowing mode of 10 cm: 13.11 c/ha of feed units, 1.29 digestible protein and 15.96 GJ/ha of exchange energy, while providing feed units with protein at the level of 98.40 g.

As it is known, aftermathability of Sudan grass is largely determined by the mowing height of mowing mass. Depending on the cut height, different number of renal renewal gemma remained not cut into unalienable stems from which new shoots appeared at different rates. Therefore, the duration of the inter-mowing periods was different. In the research with an increase in the height of plants cut, the duration of the intermowing period decreased and thus the period of mowing came earlier. When harvesting at a height of 15 cm, the period of after-grass mowing in 2018-2020, depending on the conditions of vegetation, came 20-26 days after 1 mowing, at a mode of 10 cm after 25-30 days, and at the height of 1 mowing at the level of 5 cm, the yield of after-grass came in 35-40 days. This is due to the fact that with an increase in the cut height, renewal gemma of stage-older ones with a high rate of development and low growth intensity remain on the stems.

As shown by the data of studies of 2018-2020 in the experiments, biometric indicators and productivity, as well as feed value, depended on the mowing height of Sudan grass in 1 mowing. In the second mowing, on average, for 3 years of research, the highest after-grass plant formation was formed during harvesting at the level of 5 cm - 45.50 cm. The lowest plant formation was obtained during harvesting at the mode of 15 cm - 33.23 cm. The height of Sudan grass after-grass at the height of 10 cm was 39.04 cm.

The height of grass mowing influenced the leaf content in the crop, in the tilling capacity of Sudan grass plants.

In the experiments, the highest leaf formation of after-grass was determined during harvesting in the mowing mode of 5 cm - 42.45%, and the smallest in the mowing mode of 15 cm - 28.75%. When harvesting mowing mass at the level of 10 cm, leaf formation of after-grass was 37.13%. When harvesting at the level of 5 and 10 cm, Sudan grass plants had tilling capacity of 4.12-4.16 and when raising the mowing height to 15 cm, the number of shoots per 1 plant was at the level of 4.08 pieces.

On average, for 2018-2020, in the experiments, the preservation of Sudan grass plants beforeafter-grass mowing was at the level of 73.90-76.52 %.

In 2 mowing, the productivity and feed value of Sudan grass after-grass depended on the timing of 1 mowing. At the same time, in 2 mowing, the highest productivity was determined on the crops of Sudan grass in 2019. In 2020, due to dry weather conditions, there was a decrease in the productivity of Sudan grass.

On average, for 2018-2020, the most productive plant formation with high energy-protein indices was obtained when harvesting mowing mass in the mowing mode of 5 cm. In this mode, the collection of green and dry mass was 35.95 and 8.88 c/ha, and the yield of feed units and digestible protein is at the level of 7.81 and 0.66 c/ha at the collection of exchange energy 9.20 GJ/ha.

Harvesting 1 mowing mass at the height of 15 cm reduced the productivity and fodder value of Sudan grass in 2 mowing. In this mode, on average for 3 years, the productivity and feed value of after-grass were minimal and amounted to: 20.18 c/ha green mass, 5.03 c/ha dry mass, 4.43 c/ha feed units, 0.31 c/ha digestible protein and 5.21 GJ/ha exchange energy. The mode of mowing Sudan grass at the height of 10 cm in terms of after-grass productivity in 2 mowing in terms of productivity and fodder value occupies an intermediate position.

The total productivity of Sudan grass for 2018-2020 depended on the height of 1 mowing.

At the same time, the highest productivity with high protein collection and exchange energy was determined during the mowing regime of Sudan grass at the height of 5 cm. Increasing the mowing height of mowing mass to 10 and 15 cm reduces the productivity and feed value of Sudan grass plant formation (Table 2).

Table 2 – Total productivity of Sudan grass depending on the height of mowing for 2 mowing, average for 2018-2020

Indication	Height of mowing mass, cm		
	5	10	15
Green mass, c/ha	118,83	99,07	77,67
Dry weight, c/ha	27,59	23,03	17,97
Feed units, c/ha	23,15	19,31	15,06
Digestible protein, c/ha	2,16	1,77	1,36
Provision of feed units with protein, g	93,30	91,66	90,30
Exchange energy, GJ/ha	27,87	23,28	18,17

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ТҮЙІН

Қазақстан Республикасының экспорттық әлеуетін арттыру шеңберінде ауыл шаруашылығын дамытудың 4 басым бағыты айқындалды, олардың ішінде өсімдік шаруашылығын әртараптандыруды жүргізу маңызды болып табылады. Осыған байланысты, жақын арада өсімдік шаруашылығы саласында бидай алқаптарының бір бөлігін неғұрлым сұранысқа ие дақылдарға (жемдік және майлы дақылдар) ауыстыру бойынша әртараптандыру жұмысы жалғасатын болады, бұл дақылдар өнімділігінің ауа райы жағдайларына тәуелділігін төмендету үшін де маңызды болып табылады. Мақалада Батыс Қазақстанның құрғақ далалы аймағы жағдайында судан шөбін өсірудің бейімделген технологияларын әзірлеу бойынша зерттеулердің деректері ұсынылған. Судан шөбі-құрғақшылыққа төзімді және пластикалық дақыл ретінде фермерлер арасында үлкен тартымдылыққа ие. Оның технологиясының маңызды сәттерінің бірі – жасыл массасының ору биіктігі. Зерттеулерге сәйкес, Батыс Қазақстанда өнімділік пен сапаны арттыру үшін судан шөбінің жасыл массасын 5 см деңгейінде шабу керек. Осы режим бойынша зерттеулерде судан шөбінің жасыл массасының орташа өнімділігі 3 жыл ішінде 118,83 ц/га құрады, жемшөп бірлігінің өнімділігі 23,15 ц/га болған кезде ақуыз өнімділігі 2,16 ц/га деңгейінде болды. Жалпы алғанда, алынған ғылыми мәліметтерді іске асыру отандық фермерлерге сапалы өнімдермен жаңа нарықтарға шығуға мүмкіндік береді, бұл әлемдік кеңістіктегі елдің рейтингін көтеруге ықпал етеді.

РЕЗЮМЕ

В рамках повышения экспортного потенциала Республики Казахстан выделено наиболее 4 приоритетных направлений развития сельского хозяйства, среди них важным является проведение диверсификации растениеводства. В связи с этим, в ближайшее время в отрасли растениеводства будет продолжена работа по диверсификации, заменой части площадей пшеницы под более востребованные культуры (кормовые и масличные), что является важным и для снижения зависимости продуктивности культур от погодных условий. В статье представлены данные исследований по разработке адаптивных технологий возделывания суданской травы в условиях сухостепной зоны Западного Казахстана. Суданская трава – как засухоустойчивая и пластичная культура имеет большую привлекательность среди фермеров. Одним из важных моментов его технологии является высота среза укосной массы. По данным исследований, в Западном Казахстане для повышения урожайности и качества целесообразно скашивать зеленую массу суданской травы на уровне 5 см. В исследованиях по этому режиму средняя урожайность зеленой массы суданской травы за 3 года составила 118,83 ц/га. При урожайности кормовых единиц 23,15 ц/га сбор белка находился на уровне 2,16 ц/га. В целом реализация полученных научных данных позволит отечественным фермерам выйти на новые рынки с качественной продукцией, что позволит поднять рейтинг страны в мировом пространстве.

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ПРИЕМЫ ВОЗДЕЛЫВАНИЯ ЖИТНЯКА НА КОРМ И СЕМЕНА В УСЛОВИЯХ СЕВЕРНОГО КАЗАХСТАНА

Аннотация

В статье изложены результаты проведенных исследований по комплексной оценке возделывания житняка нового сорта «Бурабай» на кормовые цели и семенную продуктивность в условиях горно-сопочной зоны Северного Казахстана. Разработаны основные приемы технологии возделывания житняка. Для получения высококачественного корма и семян необходимо проводить основную плоскорезную обработку почвы на 20-22 см, в начале осени. В среднем за годы исследования (2017-2020 гг.) установлено существенное повышение урожайности сена и получаемых семян по сравнению с известным способом (плоскорезная обработка на 25-27 см) на 7,8 ц/га СВ сена и семян на 2,3 ц/га, снизились энергозатраты на 18,7 МДж, повысилась рентабельность на 43,9%. Весной при наступлении физической спелости почвы проводят закрытие влаги и предпосевную обработку почвы на 12-14 см с последующим проведением посева житняка с нормой высева 2 млн. всхожих семян, с шириной междурядья на корм – 30 см, на семена – 45 см. При этом урожайность корма (сена) повысилась с 17,0 до 31,0 ц/га СВ, семян с 3,7 до 6,0 ц/га. Улучшилось качество семян. Рентабельность повысилась с 27,1 до 68%. В целях создания стабильной кормовой базы на севере Казахстана, необходимо увеличить площади посевов многолетних трав, среди которых лидирующее положение занимает житняк (Agropyron pectiniforme roem. et schult.). Он обладает высокой зимостойкостью и засухоустойчивостью. Одной из причин сдерживающих развитие животноводства в регионе является слабая кормовая база. Решающим фактором создания прочной кормовой базы является полевое травосеяние, а также разработка адаптивной (энергосберегающей) технологии возделывания в условиях сопочно-равниной зоны Северного Казахстана. Современные сорта даже одной культуры могут существенно различаться по биологии роста и развития, срокам созревания и продуктивному долголетию, устойчивости к болезням и вредителям, типу хозяйственного назначения (сенокосные, сенокосно-пастбищные, пастбищные, газонные), что требует особых подходов к разработке их сортовой агротехники. Главное условие реализации потенциальных возможностей многолетних трав по семенной продуктивности – освоение в производстве эффективных, экологически безопасных технологий выращивания и уборки семян, основанных на достижениях науки и передовой практики. Одним из факторов увеличения производства семян многолетних трав и стабилизации его по годам с целью наиболее полного удовлетворения научно обоснованной потребности кормопроизводства в высококачественном посевном материале является организация