тиімді ықпал ету қажет. Осыған байланысты құнарлылық деңгейінің өзгеруін уақтылы анықтауға, қажет болған жағдайда тиісті түзету іс -шараларын әзірлеуге, сондай-ақ болашақта жүйенің жай-күйін болжауға мүмкіндік беретін мониторингтік зерттеулердің рөлі артады. Зерттеулер астық-пар ауыспалы егісінде ұзақ уақыт пайдаланылуына байланысты топырақ жамылғысының агрохимиялық және агрофизиялық көрсеткіштерінің өзгеретінін анықтады.

РЕЗЮМЕ

Состояние почвенного покрова, уровень плодородия почв во многом определяют продуктивность возделываемых сельскохозяйственных культур, уровень развития агропромышленного комплекса. Современные почвы претерпевают значительные изменения в процессе освоения и использования в сельскохозяйственном производстве. Продовольственная безопасность Республики Казахстан в значительной степени определяется качественным состоянием сельскохозяйственных угодий, которое, в свою очередь, зависит от антропогенной нагрузки. Как избыточное, так и недостаточное вложение энергетических субсидий в агроэкосистему может привести к возникновению негативных последствий агрономического и экологического плана. В последние десятилетие значительный ущерб почвенному покрову наносится следствие нерационального ведения хозяйства, нарушения земледельческих технологий, связанных с изменившейся экономической ситуацией в стране и ухудшением экологических условий. Это приводит к изменению многих физико-химических свойств темно-каштановых почв. Отмечается снижение содержания гумуса, насыщенности почвенного поглощающего комплекса обменными основаниями, показателей эффективного плодородия почв. Нарушается водный баланс, в связи с трансформацией физических свойств темно-каштановых почв в худшую сторону. Поэтому необходимо как можно более эффективно по способствовать сохранению почвенного плодородия. В связи с этим повышается роль мониторинговых исследований, которые позволяют своевременно выявить изменения уровня плодородия, при необходимости разработать соответствующие корректирующие мероприятия, а также спрогнозировать состояние системы в перспективе. Исследованиями установлено трансформация агрохимических и агрофизических показателей почвенного покрова при длительных использованиях в зерно-паровом севообороте.

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STUDYING THE IMPACT OF CLEANING TERM ON THE PRODUCTIVITY AND FEEDING VALUE OF *S. SUDANENSE (RIPER) STAPF.*

Abstract

The most important link in the creation of a sustainable forage base in the rainfed lands of the Ural region is the obligatory cultivation of drought-resistant sorghum crops. Among this group of crops *S. Sudanense (Riper) Stapf.,* is considered promising. According to the features of the photosynthetic cycle, Sudanese belongs to the type of C4, which determines its high productivity. In dry weather conditions, it provides stable yields compared to traditional fodder crops, is able to grow quickly after mowing, and can be used for silage, haylage, grass meal and green mass. However, despite all the advantages noted, the areas under crops of Sudanese grass are by now insignificant and its productivity in the West Kazakhstan region remains very low. The main reason is the lack of adaptive technologies for its cultivation. In this regard, the study of elements of the cultivation technology of Sudanese grass, which is the basis, the timing of harvesting the harvesting period: before cutting out, at the beginning of sprouting, flowering for the production of green fodder, haylage and for haymaking, determined the choice and relevance of the research topic. The aim of the research is to study the elements of adaptive technology for the cultivation of Sudanese grass to provide agricultural commodity producers with high-quality feed raw materials. As a result of the research, data were obtained on the study of elements of adaptive technology for the cultivation of Sudanese grass, namely, the timing of harvesting in conditions of zone 1 of the West Kazakhstan region in the cultivation of green mass, haylage and hay for production.

***Keywords**: S. Sudanense (Riper) Stapf, harvest time, green fodder, haylage, hay, productivity, feed value.*

In the modern period of development of market relations, there is a need for a higher economic return from agricultural production. The fulfillment of the priority direction adopted by the President and the Government of the Republic of Kazakhstan on the development of animal husbandry is impossible without increasing the productivity of fodder production by selecting the most productive crops and improving the technology of their cultivation. On the basis of intensification of field and grassland fodder production, it is necessary to significantly increase the production of coarse and succulent feeds, make more wide use of advanced technologies for their cultivation, harvesting and storage, and radically improve the structure and quality of feeds.

In the near future, according to the program of development of the agroindustrial complex until 2017–2021, work on crop diversification will be continued in the crop industry by replacing part of the wheat areas for more popular crops (oilseeds, barley, maize, forage crops) [1]. In recent years, in Western Kazakhstan due to the diversification of agricultural production. commodity producers widely began to cultivate drought-resistant Sudanese grass. High environmental plasticity and otavennost, the ability to form a good mass during the summer depression of perennial grasses, the possibility of sowing in several terms and excellent palatability of green mass by all herbivores, put it among the indispensable components of the green conveyor. The value of *S. Sudanense (Riper) Stapf.* and as a culture of universal use, equally suitable for making hay, haylage, grass meal and silage, the use of green mass for feeding and grazing is invaluable. *S. Sudanense (Riper) Stapf.* after mowing or rational bleeding quickly grows and gives a growth of 5-10 cm during the day. Thanks to this, Sudan grass can be used in hay and pasture regimes and in a green conveyor on field lands [2, 3].

Due to unsustainability, Sudanese grass is a promising crop for pasture use. When cultivating in pasture mode, the timing of the onset of phenological phases and the length of the growing season are of great practical importance, since these indicators determine the timing of economic use. IN AND. Grigoriev established the absence of photoperiodic induction in various varieties of Sudanese grass, which makes it possible to regulate the time at which plants achieve fitness for economic use in a particular soil-climatic zone [4].

The timing of mowing Sudan grass has been studied by many scientists and all scientists have different attitudes to the optimal mowing time of Sudan grass. So, M.S. Pants (1935) recommends the use of Sudanese grass for food in the period from the beginning of the ejection of panicles to the flowering phase [5]. According to M.P. Elsukova, A.P. Movsisyan (1951). The best period for harvesting is the beginning of the emergence of panicles [6].

The studies are performed on the experimental field of Zhangir Khan University under the program of grant financing of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan on the topic of the IES AP05130172 «Development of adaptive technologies for the cultivation of forage and oilseeds in relation to the conditions of Western Kazakhstan», as well as on the topic of his doctoral dissertation «Increasing productivity and feed value *S. Sudanense (Riper) Stapf.*in the dry-steppe zone of Western Kazakhstan».

The soil of the experimental plot is dark chestnut heavy loamy silty silty, physical clay in the arable horizon contains 51%. The topsoil contains humus 2.8–3.1%. The accumulation of carbonates begins in the lower part of horizon B, with a maximum in the SC horizon at a depth of 70–80 cm. The amount of absorbed bases in a layer of 0–10 cm is 27.8–28.0 mg eq per 100 g of soil. To a depth of 80 cm, Ca, deeper than Mg, prevails. The Na content in the arable and subsurface horizons is low 3.1–3.6% of the amount of absorbed bases. The soil in the 1.5-meter layer contains (PV) 672.5 mm of moisture, and holds (NV) - 481.3 mm, of which productive (DAI) is 236.7 mm, in the topsoil - 160.8; 102.1; 57.6 mm. The bulk density of the soil varies from 1.22–1.28 g/cm^3 in the arable layer to 1.65–1.66 g/cm^3 at a depth of 80–120 cm.

According to the morphological characteristics of the genetic horizons of the profile and the agrochemical indicators of the arable layer, the soil of the experimental plot is characteristic of 1 zone of Western Kazakhstan.

The area of the plots is 50 m^2, repeated three times, the location of the plots is randomized. The experiments used a variety of *S. Sudanense (Riper) Stapf.* Brodskaya 2. Tillage system adopted for 1 zone of the West Kazakhstan region.

When conducting field experiments, surveys, observations of the onset of phenological phases, and the growth of *S. Sudanense (Riper) Stapf.* were carried out according to generally accepted methods [7]. Photosynthetic activity of crops was studied according to the generally accepted method [8].

Harvesting and accounting of the crop in a continuous method, followed by reduction to standard humidity.

Statistical processing of research results by the method of dispersion, analysis using computer programs [9].

As shown by research data, the timing of mowing directly affect the indicators of bushiness. So, when cleaning, before brushing up the bushiness of *S. Sudanense (Riper) Stapf.* was 3.7. When harvesting at the beginning of spraying, the number of shoots from *S. Sudanense (Riper) Stapf.* is 3.8 pcs. on the plant. With further prolongation of the period of harvesting before the flowering phase, the number of shoots of Sudanese grass increased to 3.9 pcs. on 1 plant.

At the same time, with early harvesting for green fodder, a reduction in the thickness of the internodes of the stems of 3.9 mm was noted (before spraying). When harvesting for haylage at the beginning of sweeping of *S. Sudanense (Riper) Stapf.*, the thickness of the internodes of the stems was 4.0 mm, and when harvested in the flowering phase for hay, this figure is 4.1 mm.

According to the analysis of the crop structure, the harvesting time has a significant impact on the leafiness of Sudanese grass, which, as the most valuable part of the crop, determines the quality of the product (protein content and other nutrient components of the crop). In studies in 2018, when harvesting Sudanese grass, before harvesting, the share of leaves in the total yield structure was 41.22%. With the postponement of the harvesting period at the beginning of the sweeping of *S. Sudanense (Riper) Stapf.* , the proportion of leaves in the crop structure decreased to 36.28%. A further decrease in the number of leaves in the structure of the crop was noted when harvesting the cutting mass in the flowering phase of *S. Sudanense (Riper) Stapf.*. In this embodiment, the proportion of leaves in the overall structure of the crop was 23.71%.

To obtain a guaranteed yield, the safety of crops is important. In our studies in 2018, the safety of crops of Sudanese grass depended on the timing of harvesting grass stands. If, when harvesting Sudanese grass, after 41 days of sowing in a phase before planting on green fodder, the safety of crops was 85% (121.12 plants per m^2 out of 142.5 pieces were preserved), then agrophytocenosis after 4 days, ie . in the beginning phase, spudding (for haylage) reduced the safety of crops to 82%. In this embodiment, 116.85 pieces have been preserved. plants per m^2 of 142.5 pcs.

When harvesting in the flowering phase, that is, 50 days after sowing hay, the safety of crops in comparison with the previous 2 harvesting options (green fodder and haylage) was minimal and amounted to 74.0% (105.45 plants / m^2 of 142 , 5 pcs.m^2).

As shown by the data of biometric studies in 2018, the height of the plants of *S. Sudanense (Riper) Stapf.* depended on the timing of harvesting grass stands. In our studies with the extension of the period of harvesting, an increase in the growth of *S. Sudanense (Riper) Stapf.* was noted. So, if, during harvesting before planting, the height of the plants of *S. Sudanense (Riper) Stapf.* was 51.32 cm, then during the periods of beginning of emergence and flowering, there was a further increase in plant growth to 57.13 and 60.25 cm, respectively.

As shown by the analysis data, the average daily gain of *S. Sudanense (Riper) Stapf.* in the first crop was higher when the harvesting period began to start out at 1.10 cm. With the earlier period before sprouting and with the extension of the harvesting period before flowering, the average daily growth of *S. Sudanense (Riper) Stapf.* was less than the beginning of sweeping and amounted to 0.86 and 0.94 cm, respectively.

The productivity of any culture is formed not only due to the powerful vegetative mass, but also due to the morphobiological feature of the structure of individual organs. Depending on this, the leaf surface area is formed in different ways. What directly affects the photosynthetic potential of plants. In studies, the largest area of leaves was in Sudan grass harvested in the flowering phase - 11.42 thousand m^2 / ha, with a photosynthetic potential of 0.57 million m^2 / ha.

When harvesting in a phase before spraying on green fodder, with a growing season of 41 days, the leaf area of Sudanese grass was 8.04 thousand m 2 / ha, with a photosynthetic potential of 0.33 million m 2 d / ha. The delay in harvesting time (up to the beginning of spudding) (for haylage) for up to 45 days provided Sudanese grass with a leaf surface area of 8.24 thousand m 2 / ha, while the photosynthetic potential of the crops was 0.37 million m 2 d / ha.

Yield, according to D. Azzi. (1959), reflects and integrates the action of all factors that influence the plant during their development, and its magnitude is always the result of a compromise between productivity and stability [10].

The agronomical interpretation of plant adaptability suggests, according to A.A. Zhuchenko (1990), this use of environmental resources and resistance to abiotic and biotic stresses, which provide a high yield index and indicators of its quality, and, consequently, the minimum costs of assimilators to maintain the constancy of metabolic processes of plants [11].

According to research data, the productivity of Sudanese grass depends on the timing of mowing the cutting stock.

In studies in 2018, when harvesting Sudanese grass before spraying, the yields of green and dry mass were c63.17 and 13.68 c/ha, respectively. The postponement of the harvesting dates to the beginning of making out Sudan grass ensured the collection of green mass at the level of 69.43 c/ha, and the dry weight of 15.59 q/ha (Table 1).

Table 1 - The productivity of *S. Sudanense (Riper) Stapf.* depending on the time of mowing, kg / ha

Indicators	Terms of cleaning the cutting weight		
	Before spurting	At the beginning of spurting	Bloom
Green weight	63,17	69,43	79,25
Dry weight	13,68	15,59	19,66
LSD_{05}dry matter, c / ha	1,10		

When harvesting the mowing weight for hay in the flowering phase, the collection of green mass and dry crop of Sudanese grass increased to 79.25 and 19.66 c/ha, respectively. In this embodiment, as compared with earlier harvesting periods, the collection of green and dry mass of crops is 6.26-16.08 and 1.91-5.98 c/ha more. This is the best option for the productivity of Sudanese grass. The increase in the productivity of Sudanese grass in the flowering phase is associated with an increase in leaf and vegetative mass in comparison with the earlier vegetation phases.

Thus, in the conditions of the West Kazakhstan region, the maximum productivity of the green mass of Sudanese grass in 1 cut is ensured when harvesting the cutting mass in the flowering phase. Harvesting Sudan grass earlier (before and at the beginning of sprouting) reduces the proportion of leaves in the total crop, and also reduces the productivity of Sudan grass to collect green and dry matter.

In the conditions of zone 1 of the West Kazakhstan Region, crops of *S. Sudanense (Riper) Stapf.* are of particular importance for the production of feed-balanced production. Accounting for the productivity of Sudanese crops was carried out both in physical terms (green mass and dry weight) and in feed value (output of feed units and digestible protein per unit area).

Based on the results of chemical analysis of the green mass of Sudanese grass, conducting calculations for the yield of feed units, digestible protein and metabolizable energy, produced an energy-protein assessment of crops.

In terms of the collection of feed units, digestible protein, the productivity of *S. Sudanense (Riper) Stapf.* in 1 cut was high when harvested in the flowering phase for hay (15.25 and 1.30 c/ha) (Table 2).

Table 2 - The feeding value of *S. Sudanense (Riper) Stapf.*depending on the time of mowing, c/ha

Indicators	Terms of cleaning the cutting weight		
	Before spurting	At the beginning of spurting	Bloom
Feed units, kg / ha	11,90	12,78	15,25
Digestible protein, c/ ha	1,27	1,26	1,30
Provision of protein feed units, g	107	99	85
Exchange energy, GJ / ha	14,18	15,57	18,65

The lower yield of feed units and digestible protein from 1 ha compared with the option of harvesting in the flowering phase was on harvesting options for *S. Sudanense (Riper) Stapf.* for haylage in the start phase and for green feed before spraying (12.78 and 1.26 c/ha).

When harvesting before harvesting, the productivity of *S. Sudanense (Riper) Stapf.* in the output of feed units compared to harvesting in the beginning of the beginning of sprouting and flowering was lower by 2.47-3.35 c/ha. During harvesting, a slight increase in the yield of digestible protein (1.27 c/ha) was observed compared to harvesting for haylage in the beginning phase of spudging (1.26 c/ha), which is explained by a decrease in protein digestibility.

A relatively high level of protein supply of feed units is noted on the variant of harvesting Sudan grass for green fodder before spraying (107 g). This indicator in other types of harvesting for hay and haylage decreased and amounted to 85-99g, respectively.

In all 3 experimental plots, a relatively higher exchange energy was detected in the variant of harvesting Sudan grass for hay in the flowering phase –18.65 GJ / ha. The yield of exchange energy on the harvesting options of Sudanese grass in the phases before and the beginning of the emergence was at the level of 14.18-15.57 GJ / ha.

In studies in 2018, a single-species sowing of Sudanese grass was evaluated by crop aftermath.

The inter-axis period of *S. Sudanense (Riper) Stapf.* depends on the timing of mowing the first cut. The duration of the growing season of *S. Sudanense (Riper) Stapf.* when harvesting at the beginning of sweeping was 41 days, while cleaning during the sweeping period of 45 days and during the flowering period of 50 days. The length of the inter-cut period (from harvesting 1 mowing to cleaning 1 aftermath or 2 mowing) in the first variant (at the beginning of cutting out) was 27 days, in the second variant (before making out) 30 days and in the flowering period 35 days.

In the second crop, due to a decrease in the growing season, the height of the Sudanese grass plants was lower compared to the first crop plants. In the second crop, the growth trend is also maintained, which was noted in the first crop, with the extension of the harvesting period, a decrease in the height of the plants was noted from 37.5 cm (beginning of sweeping) to 30.15 cm (flowering).

As shown by the data of biometric measurements in 2018, in 2 mowing compared with 1 mowing, a decrease in the leafiness of Sudan grass plants was observed. At the same time, the leafiness of the aftermath also depended on the timing of mowing the *S. Sudanense (Riper) Stapf.* in 1 cut or on the length of the inter-cut period.

In the experiments, a decrease in foliage was observed from 45.5 to 25.5% when harvesting Sudan grass in 1 cut from the phase before sprouting to the flowering phase.

In 2 mowing, an increase in the bushiness of Sudanese grass is noted. The number of shoots aftermath of *S. Sudanense (Riper) Stapf.*, depending on the timing of cleaning in 1 mowing, was 4.0-4.2 pcs / plant. At the same time, more bushy plants are installed with early harvesting of *S. Sudanense (Riper) Stapf.* in 1 cut.

The reduction in the inter-axial period from 35 to 27 days also had an impact on the conservation of the plants of S. Sudanense (Riper) Stapf. When cleaning the aftermath of *S. Sudanense (Riper) Stapf.* (2 mowing) on crops, the plant standings were in terms of harvesting time: 116 pcs/m^2 (before spraying), 108 pcs/m^2 (beginning of sweeping) and 103 pcs/m^2 (beginning of flowering). With an inter-axis period of 27 days, the safety of crops was 81.40%, while the inter-axis period was reduced to 30 days, safety was 75.79%. The lowest safety of crops - 72.28% was observed when harvesting Sudan grass in 1 cut in the flowering phase (inter-cut period of 35 days).

The productivity of the aftermath of *S. Sudanense (Riper) Stapf.*, in turn, also depended on the period of harvesting 1 of the mowing. At the same time, the highest collection of both green and dry mass was high when harvesting 1 mowing before sprinkling *S. Sudanense (Riper) Stapf.* - 36.01 and 8.30 c/ha. Compared to 1 harvesting period, when harvesting *S. Sudanense (Riper) Stapf.* at the beginning of sprouting and during the flowering phase, the productivity of harvesting green and dry matter after harvesting was lower by 5.91-15.027 and 1.02-3.03 c/ha, respectively, compared to 1 harvesting period. ha

In terms of fodder and energy advantages, 2 also had 1 harvesting term of 1 mowing, i.e. cleaning before sprinkling Sudanese grass - 7.22 c/ha of feed units, 0.66 c/ha of digestible protein and 8.59 GJ/ha of energy exchange.

In 2 mowing, the minimum collection of feed units (4.58 c/ha), digestible protein (0.33 c/ha) and exchange energy (5.45 GJ/ha) was obtained with 3 harvesting periods of 1 mowing, i.e. in the flowering phase of *S. Sudanense (Riper) Stapf.* for hay.

The intermediate position on energy-protein assessment is the option of harvesting *S. Sudanense (Riper) Stapf.* in the beginning phase of sprouting *S. Sudanense (Riper) Stapf.* for haylage. Here, the yield of feed units with the aftermath of *S. Sudanense (Riper) Stapf.* was 6.33 c/ha, of digestible protein 0.49 c/ha when collecting exchange energy of 7.56 GJ / hectare.

As can be seen from the research data in the amount of 2 mowing, the total productivity of single-species sowing of Sudan grass for the collection of green mass was approximately at the same level 99.18; 99.53 and 99.99 c/ha. There was a slight difference between the harvest time for the collection of dry matter and feed units. At the same time, the highest collection of dry weight and fodder units was established when harvesting Sudanese grass in the flowering phase - 24.93 and 19.83 c/ha.

On the yield of digestible protein, the advantage over 2 variants of the harvesting period was the period of cutting of *S. Sudanense (Riper) Stapf.* at the beginning of the growing season, i.e. before spawning, which is explained by the increased protein content and an increase in digestibility of feed in the earlier phases of the growing season.

According to the release of exchange energy, the difference has the option of harvesting *S. Sudanense (Riper) Stapf.* in the flowering phase. Here, in the amount of 2 mowings, 24.10 GJ/ha of exchangeable energy was collected, which is compared to the rest of the harvesting period by 0.97 GJ/ha more (start of spraying) - 1.33 GJ/ha (before spraying).

REFERENCES

1. Oficial'nyj internet resurs Prem'er Ministra Respubliki Kazahstan. www.primeminister.kz/page/article_item-89. *(in Russian)*

2. Nasiyev B.N., Eleshev R., Zhanatalapov N.Zh. Sudanskaya trava v zone suhih stepej // Ғylym zhəne bilim. – 2018. spec. vypusk. – S. 269-274. *(in Russian)*

3. Nasiyev B., Tlepov A., Zhanatalapov N., Bekkaliev A., Yeleshev R. Studing agrophytocenoses of sudan grass in the dry steppe zone of West Kazakhstan // Asian Journal of Microbiology, Biotechnology and Environmental Sciences. – 2018, Vol. 20(2). – P. 594-600.

4. Grigor'ev V.I. Vyrashchivanie sudanskoj travy pri izmenennom svetovom rezhime. Har'kovskij SKHI // Nauchnye trudy T.42. Seriya: Issledovaniya po fiziologii i biohimii rastenij. - Kiev, 1963. – S. 158-162. *(in Russian)*

5. Trusov M.S. Kormovye rasteniya. Saratov: Agroproimizdat, 1935. - S. 93-103. *(in Russian)*

6. Elsukov M.P., Movsisyanc A.P. Sudanskaya trava. - M: 1951.-184 s. *(in Russian)*

7. Metodicheskie ukazaniya po provedeniyu polevyh opytov s kormovymi kul'turami. – M., 1987. – 197 s. *(in Russian)*

8. Nichiporovich A.A. Fotosinteticheskaya deyatel'nost' rastenij v posevah: Metody i zadachi ucheta v svyazi s formirovaniem urozhaev. – M.: Kolos, 1961. – 135 s. *(in Russian)*

9. Dospekhov B. A. Metodika polevogo opyta. – M.: Agropromizdat, 1985. – 358 s. *(in Russian)*

10. Acci D. Sel'skohozyajstvennaya ehkologiya. – M.: Sel'hozgiz, 1959. – 288 s. *(in Russian)*

11. Zhuchenko A.A. Adaptivnoe rastenievodstvo. - Kishinev: SHtiinca, 1990. - 432 s. *(in Russian)*

ТҮЙІН

Орал өңірінде далалық егістіктерде тұрақты жем -шөп базасын құрудың маңызды буыны құрғақшылыққа төзімді дақылдарды міндетті түрде өсіру болып табылады. Осындай дақылдардың арасында судан шөбі - *S. Sudanense (Riper) Stapf.* болашағы өте зор. Фотосинтетикалық циклдің ерекшелігі бойынша судан шөбің С4 түріне жатады, бұл оның жоғары өнімділігін анықтайды. Құрғақшылық ауа -райы жағдайында ол дәстүрлі жемдік дақылдармен салыстырғанда өнімнің тұрақтылығын қамтамасыз етеді, орылғаннан кейін тез өсе алады және сүрлемге, пішендеуге, шөп ұнына және жасыл массаға пайдаланылуы мүмкін. Алайда, барлық белгіленген артықшылықтарға қарамастан, судан шөбі егілген алқаптардың көлемі қазіргі уақытта аздау және оның Батыс Қазақстан облысында өнімділігі өте төмен деңгейде болып отыр. Негізгі себеп-оны өсіруге бейімделген технологиялардың болмауы. Осыған байланысты судан шөбінің өсіру технологиясының элементтерін зерттеу тақырыбының таңдауы мен өзектілігін анықтады. Негізгі мақсаттардың бірі судан шөбінің ору мерзіміне байлансыты өнімділігі мен өнім құндылығын анықтау. Зерттеуде судан шөбін 3 мерзімде ору қарастырылды: сыпыртқы салу алдында – жасыл балауса өндіру үшін, сыпыртқы кезеңінің басында – сенаж даярлау үшін және гүлдеу кезеңінде құрғақ шөп даярлау үшін. Зерттеудің мақсаты ауыл шаруашылығы тауарын өндірушілерді сапалы жемшөп шикізатымен қамтамасыз ету үшін судан шөптерін өсірудің бейімделген технологиясының элементтерін зерттеу болып табылады. Жүргізілген зерттеулер нәтижесінде судан шөбі өсірудің бейімделген технологиясының элементтерін, атап айтқанда Батыс Қазақстан облысының 1 аймағы жағдайында жасыл масса, сенаж және құрғақ шөп өндіру үшін ору мерзімдерін зерттеу бойынша деректер алынды.

РЕЗЮМЕ

Важнейшим звеном создания устойчивой кормовой базы на богарных землях Приуралья является обязательное возделывание засухоустойчивых сорговых культур. Среди этой группы культур перспективной считается суданская трава - *S. Sudanense (Riper) Stapf.* По особенностям фотосинтетического цикла суданка относится к типу С4, что определяет ее высокую продуктивность. В засушливых погодных условиях она обеспечивает стабильность урожаев по сравнению с традиционными кормовыми культурами, способна быстро отрастать после скашивания и может быть использована на силос, сенаж, травяную муку и зеленую массу. Однако, несмотря на все отмеченные преимущества, площади посева суданской травы к настоящему времени незначительны и ее урожайность в Западно-Казахстанской области остается очень низкой. Основная причина - отсутствие адаптивных технологий ее возделывания. В связи с этим изучение элементов технологии возделывания суданской травы, основой которой является, сроки уборки сроков уборки: перед выметыванием, в начале выметывания, цветение для производства зеленых кормов, сенажа и для заготовки сена, определило выбор и актуальность темы исследований. Целью исследований является изучение элементов адаптивных технологии возделывания суданской травы для обеспечения сельхоз

товаро производителей качественным кормовым сырьем. В результате проведенных исследований получены данные по изучению элементов адаптивных технологии возделывания суданской травы, а именно сроков уборки в условиях 1 зоны Западно-Казахстанской области при возделывании для производства зеленой массы, сенажа и сена.

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ПРИЕМЫ ДИФФЕРЕНЦИРОВАННОГО ВНЕСЕНИЯ УДОБРЕНИЙ В ТОЧНОМ ЗЕМЛЕДЕЛИИ

Аннотация

При традиционной системе земледелия, даже при достаточно точном и обоснованном расчете необходимых доз применяемых агрохимикатов, всё равно отмечается их значительный перерасход. Это не только экономически невыгодно, но и создает реальную опасность загрязнения окружающей среды. С другой стороны, агрохимический анализ почвы, которую брали на участках с различной урожайностью, показал в пробах значительные отклонения по содержанию азота, фосфора и калия. Это связано, в первую очередь, с неоднородностью почвенного плодородия. Так как растения поглощают не только вещества, вносимые при выращивании данной (сегодняшней) культуры, но и те, что накопились в почве ранее.

Следовательно, при внесении постоянной дозы удобрений нельзя добиться оптимизации питания всех растений. Поэтому удобрения нужно вносить в почву дифференцированно, с учетом количества ранее накопленных в ней основных питательных веществ и ряда других характеристик конкретного участка поля. Стоит отметить важность данного мероприятия, поскольку оно несет в себе большие затраты. Поэтому всегда важно знать влияние обеспеченности элементами питания на формирование урожая на почвах с низким плодородием. Такие данные позволяют более подробно оценить масштабы недобора урожая по его высоте и качеству, а также дают возможность построения оптимистического прогноза на обозримое будущее точного земледелия в условиях производства Северного Казахстана.

***Ключевые слова**: точное земледелие, дифференцированное внесение удобрений, цифровая агрохимическая карта, аэрофотосъемка, урожайность, качество урожая.*

Внесение удобрений по технологии точного земледелия проводится дифференцированно, т.е., условно говоря, на каждый элементарный участок поля вносится столько удобрений, сколько необходимо именно здесь [1].

Однако некоторые исследования по изучению эффективности дифференцированного внесения удобрений за рубежом показали, что оно экономически далеко не всегда оправдывается, так как не учитывается уровень, выраженность внутрипольной пестроты плодородия почвы.

В частности, по результатам многолетних работ по дифференцированному применению азотных удобрений под семенной картофель в штате Айдахо (США) показано, что прибавка урожая по сравнению с традиционным внесением удобрений была в целом невелика, а прибыль от дифференциации доз азота не покрывала затрат на применение новой технологии. И это не единичная информация такого рода [2].

Дифференцированное внесение – один из элементов точного земледелия, позволяет избирательно, в зависимости от выноса питательных веществ из почвы, вносить минеральные