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LABORATORY ANALYSIS INDICATORS OF FEED QUALITIES OF NEW BREEDING LINES OF ALFALFA

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Abstract

The article presents the results of laboratory studies on plant foliage, moisture content, fat and protein content in alfalfa hay in new lines.

Key words

alfalfa, variety, line, standard, variety testing, nursery, plant, foliage, moisture, fat, protein, hay.

Introduction. Alfalfa plays a significant role in solving the problem of providing livestock with feed protein and improving soil fertility. Alfalfa green mass and all its processed products are valuable protein -vitamin feeds with a high content of many It contains essential amino acids and is readily palatable by all types of animals and birds. Alfalfa is also the best precursor for most agricultural crops. A highly productive crop with stable yields and nutrient yields, alfalfa also distinguishes itself from other crops by its early spring regrowth, which is essential for livestock production.

Alfalfa region has a very high nutritional value due to while a deep root system can help prevent moisture loss in dry soils [9].

P ro f es s o r B.P. Pleshkov claims that in alfalfa on average from dry matter, the content of crude protein without irrigation is 19.4 %, with irrigation – 17.4 %, fiber 21.2 and 25.2 %, respectively [4].

An important economically valuable trait of alfalfa is the protein content of its hay, which determines the nutritional value of the feed unit. Alfalfa is one of the legume crops intended for a diverse nutrient conveyor for livestock and poultry farming. Typically, alfalfa is mown for hay 1-2 times on dryland, and 4-6 times on irrigated lands. One hectare of alfalfa yields 60-75 c/ha of feed unit and 14-19 c/ha of digestible protein [7]. Research conducted in the Udmurt Republic shows that, among crops grown for animal feed, alfalfa has the highest crude protein content – 11.9%. The chemical composition and nutritional value of alfalfa positively influence the growth and development of animals. Alfalfa plants contain more digestible protein, minerals and carotene compared to other forage crops [8].

Scientists confirm that the protein content in hay in both samples and hybrids varies to varying degrees depending on the genotype of the parental forms and hybrid combinations. However, seasonal conditions have a significant impact on variability from year to year. A high heterosis effect was observed in reciprocal F $_{1\ hybrids}$ from the cross k-38382 (Drylander, Canada) and k-38457 (Local, Tanzania), although these forms did not differ significantly in protein content [6]. The polyhybrid variety Tashkentskaya-1728 exceeds the zoned variety

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Tashkentskaya-1 in hay yield by 8.7%, protein content by 1.8-2.0%, and carotene by 10-15 mg/kg. It is characterized by high foliage, thin stems, and resistance to aphids [5].

Pre-sowing treatment of alfalfa seeds and plants with growth regulators of the sym-triazine series contributed to an increase in the protein content in the vegetative mass of alfalfa by 3.2-4.6% [1].

Materials and methods. The studies were conducted in the laboratory of alfalfa breeding and seed production at the Research Institute of Agricultural Sciences and Agriculture in 2025. The nursery for variety testing of new lines was established using a laboratory small-sized manual seeder according to the methodology "Methodological instructions for conducting field experiments with forage crops" [3] with continuous row sowing at a seeding rate of 16 kg / ha ^{on} plots of 8 m2 (0.8 x 10 m) in four replicates. The main economically valuable traits determining the quality of feed were determined in the laboratory for 6 new alfalfa lines in comparison with the standard variety Tashkentskaya-1. The obtained data were processed using the analysis of variance method [2]. Laboratory analyses were carried out using the SAP device NIR 2700 according to GOST IS O 659 [10].

Research results. In this laboratory study, hay moisture content, plant foliage, fat and protein content were determined (Table 1). There was no significant difference in hay moisture content between the new breeding lines and the standard Tashkentskaya-1 variety. The standard variety had a hay moisture content of 28.21%, while the lines' hay moisture content ranged from 27.35% to 29.45%. The highest hay moisture content was observed in the S-3641 line. F $_5$ k-700 s/o Ok-Begi and S-3677 F $_5$ k-6632 Peru x Tashkent- 1, whose indicators were 29.45% and 29.27%, respectively. The standard variety's hay fat content was 8.39 %, while the breeding lines ranged from 7.86% to 8.38%. There was no significant difference between the standard and new lines in this trait. The highest hay fat content was found in the C-3636 F $_5$ k-6910 line from Villigar, Argentina, at 8.38%.

Table 1

Foliage, fat and protein content of new alfalfa lines (2025)

Catalog number and sample name	Hay moisture content, %	Content at, %	Foliage, %	Content protein, %					To standard, %
				I	II	III	IV	Average	
Tashkentskaya-1 - standard	28.21	8.39	41.8	17.38	17.77	17.13	16.27	17.14	100.0
C-3 636 F $_5$ k-6910 s/o Villigar	28.19	8.38	42.9	16.26	16.86	18.61	18.76	17.62	102.8
C-3637 F $_5$ T a s -2009 – s/o	28.78	8.25	43.1	16.50	16.83	16.74	18.14	17.05	99.5
C-3639 F $_5$ k-3026 x Tash -2009	27.38	8.19	42.9	16.59	19.22	17.50	16.68	17.50	102.1
C-3641 F $_5$ k-700 s/o Ok-Begi	29.45	7.86	42.1	14.02	16.69	16:45	17.08	16.06	93.7
C-3677 F $_5$ K-6632 Peru x T - 1	29.27	8.10	41.4	15.60	14.61	16.84	16.80	15.96	93.1
C-3633 F $_5$ Tash -1728 - s/o	28.55	8.14	2.2	17.46	17.87	18:35	17.38	17.77	103.7

m = ± 0.2 7 md = ± 0.32 P = 3.96

The most significant traits of alfalfa are plant foliage and hay protein content, which determines the feed unit of alfalfa. From research results and literary sources, we know that protein is contained more in plant leaves than in stems, so studying the above trait is important in feed production for farm animals. According to laboratory analysis, the average foliage index for four replicates of the standard variety Tashkentskaya-1 was 41.8 %. For this trait, the breeding lines C-3636 F $_5$ k-6910 c/o Villigar Argentina, C-3637 F $_5$ Tashkentskaya -2009 – s/o and C-3639 F $_5$ k-3026 x Tashkent -2009 was determined to be 42.9%, 43.1% and 42.9%, respectively. The lowest foliage of plants was found in the line C-3677 F $_5$ k- 6632 Peru x Tashkentskaya - 1, which has an indicator lower than the standard variety by 0.4%.

In our studies, biochemical analyses show that the protein content in hay of the standard Tashkentskaya-1 variety was 17.14%. According to this trait, the new lines C-3636 F $_5$ k-6910 c/o Villigar Argentina, C-3639 F $_5$ k-3026 x Tashkent -2009 and C-3633 F $_5$ Tashkentskaya-1728 - s/o The hay protein content of the studied lines was 17.62%, 17.50%, and 17.77%, exceeding the standard by 2.1-3.7%, which is a good indicator for new breeding lines. The remaining studied lines were below the standard by 0.5-6.9%.

According to the data received from C-3636 F $_5$ to-6910 c/o Villigar Argentina, C-3639 F $_5$ k-3026 x Tashkent -2009 and C-3633 F $_5$ Tashkentskaya-1728 - new breeding lines, according to a set of characteristics that determine the quality of alfalfa feed, are superior to the standard Tashkentskaya-1 variety.

Conclusions. It has been determined that the new lines C-3636 and C-3637 have superior foliage and C-3639 exceeded the standard variety Tashkentskaya-1 by 1.1-1.3% ;

– biochemical analyses confirm that the protein content in hay of the standard Tashkentskaya-1 variety was 17.14%, and in the selection lines C-3636, C-3639 and C-3633 was 17.62%, 17.50% and 17.77%, respectively ;

– it was revealed that the selection lines C-3636 F $_5$ k-6910 c/o Villigar Argentina, C-3639 F $_5$ k-3026 x Tashkent -2009 and C-3633 F $_5$ Tashkentskaya-1728 - s/o surpassed the standard Tashkentskaya-1 variety in a set of economically valuable traits that are of interest in alfalfa breeding for the creation of new varieties with high yield and feed quality.

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10. GOST IS O 659 Determination of the content of proteins, fats and other parameters in the composition of plants.