

Economically Valuable Traits of Alfalfa Plants in The Variety Testing Nursery

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Abstract. The article presents the three-year results for 2018-2020 of studies on height, leafiness of plants, protein content, as well as hay yield in alfalfa samples in the nursery of the 2018 sowing variety test. The studied accessions and the standard variety Tashkent-1 almost did not differ in plant height - the difference was only 1-2 cm. plants was higher than the standard by 3-2cm. The highest leafiness of plants was in samples C-3646 (variety Zia, USA), C-3327 (I.o. Prima, France) and C-3649 (F2 Tashkent-721x group of varieties) 48.1%, 47.5% and 46.4% respectively, which exceeded the standard variety. The high protein content of hay enhances the nutritional quality of alfalfa. According to this indicator, the data obtained show that the varieties S-3649, S-3646 and S-3647 had superiority over the standard variety Tashkent-1 (17.85%) by 1.03-1.32%. According to the total hay yield for two years, samples S-3647 and S-3649 were 108.6% and 106.1% higher in comparison with the standard variety (129.0 c/ha). And in the rest of the samples, the hay yield was lower than that of the Tashkent-1 variety. According to the combination of a set of traits, samples C-3647 (M.o. from variety 2711x group of varieties) and C-3649 (F2 Tashkentskaya-721x group of varieties) are of the greatest interest for breeding.

Key words: alfalfa, variety, plant, line, breeding, variety testing, hay, foliage, productivity, nutritional value, protein, fodder.

1 Introduction

In the Decrees of the President of the Republic of Uzbekistan dated January 29, 2020 “On additional measures of state support for the livestock industry” in order to accelerate the development of the livestock industry, introduce modern and innovative methods, increase the volume and expand the range of products, as well as uninterrupted provision of the population with high-quality and affordable livestock products, produced in local conditions, state support for enterprises specializing in animal husbandry to ensure the sowing of alfalfa 10 percent of the sown area of cotton-textile clusters and farms of cotton-growing and grain-growing direction [1-2]. Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 14 dated January 9, 2019 “On additional measures for land

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reclamation of farm and other agricultural enterprises and the efficient use of agricultural land [3].

In recent years, the regulation of land and water relations in agriculture [4], the efficient use of agricultural land, the introduction of innovative technologies in the industry [5-8], the reduction of low-yielding cotton and grain fields have led to higher prices for profitable, export-oriented products [9]. To ensure the placement of other agricultural crops (alfalfa, vegetables, melons) on 10 percent of the area of cultivated land that increase soil fertility and satisfy the needs of the population for food and animal husbandry for feed [10]. At the same time, special attention should be paid to ensuring the balance of feed in terms of protein and other components, that is, improving feed quality, rational use and reducing feed losses. In this regard, it is necessary to expand crops and improve seed production of high-protein crops, in particular alfalfa.

In the Central Asian region, alfalfa is the leading crop as a high-yielding, high-protein fodder plant and as an essential component of cotton and other crop rotations that increase soil fertility. Alfalfa is the best accompanying crop rotation for cotton, it helps to eliminate diseases and salinity of soils, enriches the land with minerals [11-15].

Alfalfa, the most popular in terms of productivity under irrigation, ranks first, both in terms of yield of green mass (600-700 c/ha), and in terms of protein yield per unit area. It gives 3-4 full-fledged mowings when mowing at the beginning of the herbage flowering with the distribution of the green mass yield in the first mowing of about 40%, in the second - 30%, in the third - 20%, in the fourth - 10%. With each mowing, the quality of the feed improves, the foliage of plants and the eating of hay by animals increase [16-17].

However, the varieties of alfalfa currently cultivated in production are not sufficiently productive and contain only 14-17% protein in the feed and do not fully satisfy the growing needs of animal husbandry. In this regard, it is necessary to intensify scientific research on the development of new high-yielding varieties and hybrids of alfalfa with increased feed nutrition.

The introduction of new varieties and hybrids of alfalfa into production will allow obtaining a larger volume of high-protein feed per unit of cultivated area, that is, it will improve the provision of livestock with valuable feed and increase the production of livestock products up to 10-15%. In addition, an increase in the areas under zoned varieties of alfalfa will lead to an improvement in the structural condition, the content of essential nutrients (humus by 0.4%, nitrogen by 250-600 kg/ha, phosphorus 30-120, potassium 200-250, calcium 180- 350 kg/ha) and improving the soil, that is, improving the fertility of land and introducing crop rotations [18-20]. According to Islomov I. [21], alfalfa accumulates from 0.3 to 0.5% of humus in the arable soil layer over 3 years of standing.

For effective breeding work with alfalfa, it is necessary to deeply and comprehensively study the agrobiological properties and economically valuable traits of existing local, breeding and wild-growing samples of various geographic origins, to identify among this diversity the best plant forms in a number of indicators and use them as starting material in obtaining new ones. highly productive and locally adapted varieties and hybrids with the best forage quality. The methodology of breeding work with alfalfa is described in the works of a number of authors [22-24].

Many researchers have studied local and breeding varieties and wild-growing samples of alfalfa in a number of alfalfa-growing countries, and have identified among them the best forms in terms of certain economically valuable indicators used in breeding new varieties [25-27].

It is known that the protein content in fodder crops largely depends on the ratio of leaves and stems. Alfalfa leaves contain more protein, vitamins and minerals than stems, so their evaluation for leafiness is economically important; so at the beginning of flowering, alfalfa leaves contain 22-28% protein, and the stems - 11-13% (to absolutely dry weight).

Researchers Zhuraev Sh.T. et al. [28], Tkachenko I.K. et al. [29] Piskovatsky Yu.M. et al. [30], based on a large number of analyzes determined that alfalfa leaves contain 1.5-2 times more protein than stems. Drobets P.T. [31] from many years of research concludes that a high degree of variation in the main indicators of the studied forms of alfalfa indicates the possibility of improving them by breeding.

According to the above authors, among the studied samples of the VNIIR collection, there are valuable samples with a complex of economically valuable traits, such as high productivity, protein content in feed, disease resistance, and others. By using hybridization and directional selection, it is possible to transfer the most valuable traits and properties to the hybrid offspring of plants, and to obtain new varieties with the desired traits [32-33] [34]. At the same time, the general line of selection in the primary seed production of alfalfa is the full use of modification deviations in productivity and the strict rejection of hereditary changes, the removal of underdeveloped, diseased and reduced forms [35-36].

2 Materials and methods

The research was carried out in the laboratory of alfalfa collection, selection and seed production of the Research Institute of Selection, Seed Production and Agricultural Technology of Cotton Growing. The territory of the institute is located near the city of Tashkent in the zone 41° 22' north latitude and 38° 54' east longitude at an altitude of 584 m above sea level. The area of the Institute location is characterized by low rainfall, moderate relative humidity and high air temperature during the vegetation period.

The variety testing nursery was planted with a small-sized manual seeder according to the variety testing method (Methodology for the selection of perennial grasses, 1963) with a continuous row sowing with a seeding rate of 16 kg/ha on plots of 8 m² (0.8 x 10 m), fourfold repetition [37]. Mathematical processing of the obtained data was carried out according to the method of Sokolov A.V. [38].

The subjects of research were accessions C-3327 (I.o. Prima, France), C-3646 (variety Zia, USA), C-3647 (M.o. from variety 2711x group of varieties), C-3648 (F3 Kurganch, Surkhandarya region), C-3649 (F2 Tashkentskaya-721x group of varieties), C-3650 (F2 Tash-721x group of varieties) and standard variety Tashkentskaya-1.

3 Results and discussion

The main method of selection work with alfalfa in the laboratory is hybridization and directed selection according to the desired economically valuable traits. At the same time, as mentioned above, much attention is paid to the involvement in hybridization of the most valuable samples of the VIR world collection, which are donors of high protein content, disease resistance, high productivity, and other economically valuable traits.

The table shows data on height, leafiness of plants, protein content, as well as hay yield in alfalfa samples in the nursery of the 2018 sowing variety test. Plant height was approximately the same between the studied samples and the standard Tashkentskaya-1 (83 cm) - the difference was only 1-2 cm) the height of the plants exceeded the standard ones by 3 and 2 cm, respectively. The highest foliage of plants in the second mowing of the second year of life 48.1; 47.5 and 46.4 percent were for samples C-3646 (variety Zia, USA); C-3327 (acting Prima, France) and

C-3649 (F2 Tashkentskaya-721x group of varieties) at 45.5% in the standard variety. In the rest of the samples, the leafiness was approximately the same as in standard plants.

Table 1. Plant height and foliage, protein content, as well as hay yield in alfalfa samples in the 2018 variety testing nursery.

№ catalog	plant height, cm	foliage plants, %	Protein content, %	Hay yield by years, c/ha		Sum per 2 years	% to standard
				2018	2019		
Tashkent-1 standard	83	45,5	17,85	51,5	77,5	129,0	100,0
C-3327 (И.о.Прима, France)	84	47,5	17,76	40,8	71,1	111,9	86,7
C-3646 (grade Zia, USA)	86	48,1	19,13	50,0	72,5	122,5	94,9
C-3647 (М.о.и3 grade 2711x group of varieties)	85	48,0	19,17	57,5	82,6	140,1	108,6
C-3648 (F3 Kurganch, Surkhan. region.)	82	46,0	16,8	42,5	72,5	115,0	89,1
C-3649 (F2 Tash-721x group of varieties)	84	46,4	18,88	56,7	81,1	137,8	106,8
C-3650 (F2 Tash-721x group of varieties)	84	45,1	15,54	52,4	75,6	128,0	99,2

$m = \pm 0,56$ $md = \pm 0,79$ $P = 2,54$

The content of protein in hay in samples C-3650 (F2 Tashkentskaya-721x group of varieties) and C-3648 (F3 Kurganch, Surkhandarya region) was lower than in the standard variety by 1.05-2.35%, in sample C-3327 was the same. Samples C-3649, C-3646 and C-3647 exceeded the standard on this basis by 1.03-1.32%.

According to the hay yield, samples S-3647 and S-3649 are distinguished, which, in total for two years (2018-2019), gave yields of 140.1 and 137.8 c/ha, or the excess over the standard variety Tashkentskaya-1 was 8.6 and 6.1 percent. For sample C-3650, the hay yield was equal to the standard one, and for the rest of the samples it was 5.1-13.3% less.

4 Conclusion

1. In terms of plant height, all the studied accessions and the standard variety Tashkentskaya-1 did not differ much, they were approximately the same;
2. on the basis of leafiness of plants in the second mowing of the second year of life 48.1; 47.5 and 46.4 percent were for samples C-3646 (variety Zia, USA); C-3327 (Acting Prima, France) and C-3649 (F2 Tashkentskaya-721x group of varieties) exceeded the standard by 2.6; 2.0; 0.9% respectively;
3. The content of protein in hay in samples C-3649 (F2 Tashkent-721x variety group), C-3646 (Zia variety, USA) and C-3647 (M.o. from variety 2711x variety group) exceeded the standard variety by 1, 03-1.32%;
4. According to the hay yield, varieties S-3647 (M.o. from variety 2711x group of varieties) and 3649 (F2 Tashkentskaya-721x group of varieties) were distinguished, which in total for two years exceeded the standard variety Tashkentskaya-1 by 108.6 and 106, one %;
5. According to the combination of traits of protein content and hay yield, samples C-3647 (M.o. from variety 2711x group of varieties) and C-3649 (F2 Tashkentskaya-721x

group of varieties) are of the greatest interest for breeding, which can be recommended for further breeding work.

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