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EFFICIENCY OF DIFFICULT AGROPHYTOTCENOSIS ON THE IRRIGATED LANDS OF THE SOUTH-EAST KAZAKHSTAN

Abstract. The article presents data on pasture productivity of various grass mixtures. It is established that the maximum productivity of perennial bean-cereal grass mixtures on irrigated lands of the southeast of Kazakhstan with five-fold use for the season. During the second and fifth years of use, the yield of complex agrocenosis varies between 460,2–467,1 c/ha. The incorporation of horned grass seedlings into seeded bean-grass mixtures Lotus corniculatus increases the productivity of the grass stand from the second year by 15–25%. Perennial bean-cereal grass mixtures have a positive effect on the structure and bulk mass of the soil.

Keywords: irrigated cultural pastures, perennial bean and cereal grass mixture, Lotus corniculatus, pasturable efficiency, structure of pasturable green mass.

In many countries, creation artificial grass mixtureon an arable land, for use on the pasturable purposes, is the main factor improvement of quality and decrease in prime cost of livestock production [1-4].

According to the latest data in Kazakhstan costs of forages make up to 65% of the general cost of products of livestock production that causes need of development of cardinally new organization of branch of forage production, improvement of structure of forages, increases in their quality and decrease in the general costs of unit of the made production.

At the present stage, the most rational and perspective method of strengthening of a food supply of livestock production, practically in all zones of the republic, in large agroformations, creation and use of the irrigated cultural pastures is.

From references it is known that the efficiency well picked up for specific conditions artificial grass mixture allows to provide on the irrigated lands to 10–15 thousand fodder units from hectare, increase in protein content in a stern for 15–20% and also cost cutting of production of forages for 10–15% for unit of livestock production [1, 3, 10]. In Kazakhstan now the average yield of milk of cows in a year doesn't exceed 2,3 thousands kg on 1 head. Meanwhile in many European countries (for example, in Germany, Switzerland, etc.) this indicator is 3–4 times higher. In these countries the dairy livestock production completely is based on the cultural artificial pastures created on arable lands.

As is well-known the high efficiency of livestock production depends, first of all, on the balanced full-fledged forage. Concerning advantage of breed of cows it should be noted that the growing genetic potential of efficiency of animals as much as possible is shown when providing them by pasturable green sterns, allowing constant year-round supply of animals with nutrients.

However now cultural pastures in the republic are practically absent. According to us, wide dissemination of this very necessary production technology of high-quality pasturable green forages restrains still not a perfect of scientific developments, especially at selection of the range of herbs for creation of long agrophytotcenosis. For example, during creation of the irrigated cultural pastures 3–5 component cereal and bean grass mixture where a lucerne the sowing campaign and a cock's head were a bean component generally were used. In a year of crops the share bean in a pasturable green forage was up to 45–55%. At intensive pasturable use of such herbages, by 3–4th year of use in herbage, the share of bean

didn't exceed 20–25%. Lucerne and cock's head didn't maintain frequent drain of cattle weight and cultural pastures by 5th year of use became almost cereal, and it certainly influenced decrease in a digest protein in a green forage and receiving a qualitative livestock product with low prime cost.

In this regard it was necessary to include in grass mixture new species of bean herbs, more perspective for pasturable use. Materials of researches of the countries distant (the USA, Canada) and the neighbor (Russia, Belarus) of the abroad demonstrate prospects of inclusion of a long-term bean grass of Lotus corniculatus in grass mixture during creation of the long irrigated cultural pastures. According to foreign researches, this grass was very perspective bean component for creation of highly productive cultural herbages [5-8].

Fast and rather wide circulation of Lotus corniculatus in a fodder grass seeding in many countries happened thanks to a complex of its such economic and valuable signs as longevity (up to 10–12 years), high winter hardiness, indiscriminateness to soils (pH 4,5–8,2), a good aftermathion after bevelling and drain that is especially important at resistance to a pasture of the cattle, ability to mature flooding by thawed snow (20 days and more).

In Kazakhstan Lotus corniculatus proved as very perspective grass for improvement of water meadows and for cultivation on a forage in a foothill zone of the southeast of the republic [5].

Research of bean and cereals of grass mixtureare begun on irrigation of a foothill zone of the southeast of the republic. At the same time special attention was paid to selection of herbs for inclusion in structure grass mixture. At selection of herbs biological and ecological features of separate species of herbs were considered that have significant effect on dynamics of a harvest for the vegetative period and productive longevity of seeded herbages.

In the field experiments put in EES "Agrouniversity" of Enbekshi-kazakh district Almaty region of the Republic of Kazakhstan in the spring of 2009 grass mixture consisting of the following components are studied: from bean – a lucerne a sowing campaign, a cock's head, Lotus corniculatus; from cereals – Bromus inermis Leyss, a hedgehog the national team (a ratio of 50%+50%). The annual ryegrass pasturableis seeded as integumentary culture, for increase in efficiency of pastures in the first year of use. Crops of grass mixtureare made in the spring on April 18-20. Herbs are seeded under cover of summer barley. In the fall under the main processing of the soil brought $P_{90}K_{60}$ of active ingredient on hectare, N_{60} brought in the spring. Methods standard in crop production and forage production.

Soils of the skilled site meadow-chestnut, the maintenance of a humus in a layer of 0–20 cm – 3,20–4,60%, the humidity of the soil is maintained at the level of 70–75% of the smallest moisture capacity. The first hay crop on a pasturable forage cleans up a phase of budding of bean herbs, the subsequent hay crops with a height of escapes of 20–24 cm. The beginning of sprouting of herbs is noted on day 7–8 and full shoots on day 17–20 after sowing. Sprouts counting for 1sq.m. was carried out after harvesting the cover barley on May 20–22. The field viability of cereal herbs was at the level of 47–50%, legume herbs 54–60%. By the autumn more than 70–74% of plants (459–496 pcs/sq.m.) have been preserved. From sown herbs annual ryegrass differed in more intensive growth.

In a year of sowing the grass mixture have given two hay cuttings. The first alienation has been carried out 67–68 days after appearance of full shoots. The second alienation has been carried out 38 days after the first hay cutting: 94,5–108,4 c/ha were obtained in the first cut, in the second cut – 147,0–162,0 c/ha of pasturable green mass. For two hay cuttings the grass mixtures have yielded 241,5–282,5 c/ha of a pasturable forage. It should be noted that the high productivity of the first year is provided due to intensive growth of annual ryegrass. This grass due to intensive growth during the initial period and good aftermath ability after a hay cutting significantly increased the productivity of the grass mixture in the first year of use. The specific mass of annual ryegrass pasturable in a harvest was within 25–35%.

In the second year the growth of sown herbs is noted on April 13–18. Bird's-foot trefoil (Lotus corniculatus) is distinguished by a more intensive growth. The first hay cuttings were made 31–32 days after growth of herbs. Duration of the second hay cutting is 30-31 days, the third – 27–29 days, the fourth – 32 days and the fifth – 33 days. The last hay cutting was made on August 15-17.

In the second year for five hay cuttings grass mixture have yielded 376,2–433,6 c/ha of pasturable mass. The first hay cutting was more productive (82,7–92,6 c/ha). Then on hay cuttings was observed decrease in a harvest. In the fifth hay crop the pasturable productivity according to the variants of experience was 64,0–75,6 c/ha (Table 1).

Table 1 – Pasturable efficiency of bean-cereals grass mixture (2009–2014)

Grass mixture	Productivity of pasturable green mass by years, c/hectare					
	1st year of use	2nd year of use	3rd year of use	4th year of use	5th year of use	6th year of use
1st grass mixture (lucerne (25%) + sainfoin (25%) + Bromus inermis Leyss (25%) + orchard-grass (25%)) control	241,5	376,2	386,2	390,8	353,0	325,6
2nd grass mixture (lucerne (25%) + bird's-foot trefoil (25%) + Bromus inermis Leyss (25%) + orchard-grass (25%)	256,2	402,5	417,1	460,2	420,4	375,7
3rd grass mixture (sainfoin (25%) + bird,s-foot trefoil (25%) + Bromus inermis Leyss (25%) + orchard-grass (25%)	270,9	422,9	430,0	428,2	396,5	352,2
4th grass mixture (lucerne (16,7%) + sainfoin (16,7%) + bird's-foot trefoil (16,7%) + Bromus inermis Leyss (25%) + orchard-grass (25%)	282,5	433,6	447,0	467,1	424,7	384,6

In third and fourth uses on experiences 5 hay crops are made. The beginning of spring growth and distribution of productivity grass mixture on hay crops was approximately, as in the second year. In the third year for 5 hay crops of a grass mixture have given 386,2–447,0 c/hectare of pasturable green material. In the fourth year 390,8–467,1 c/hectare of a pasturable forage are received for 5 hay crops on experiences. From table 1 it is visible that in all years of use of a grass mixture with participation of Lotus corniculatus have yielded more big crops.

In the first year the increase has made 15,1–41,0 c/hectare, in the second – 26,3–57,4 c/hectare, in the third – 32,9–60,8 c/hectare, in the fourth year – 37,4–76,3 c/hectare, in the fifth году – 43,5–71,7μ/hectare and in the sixth year – 26,6–59,0 c/hectare. Decrease in efficiency of the 3rd grass mixture, since 3rd year of use is observed that it is connected with loss of a cock's head.

The structure of productivity of bean herbs is given in table 2. From here it is visible that in the first years the share of a lucerne and a sainfoin in a harvest was more, than bird's-foot trefoil (Lotus corniculatus). Starting with the 3-4th years of use the share of a lucerne and especially a sainfoin in a harvest has significantly decreased.

By 4 years the lucerne share in pasturable weight on hay crops was within 10,0–13,0%, the share of a sainfoin of 1,5–7,0% and vice versa, the share of bird's-foot trefoil (Lotus corniculatus) has increased to 18,5–24,6%, by sixth year a share of a lucerne and a sainfoin has considerably decreased, and the share of bird's-foot trefoil (Lotus corniculatus) has increased to 29%, that is growth and increase in mass of bird's-foot trefoil (Lotus corniculatus) in pasturable weight is noted. In general by 4th year the share bean in a harvest was at the level of 25,5–35,0%, and in the sixth year – 20,6–29,0%.

Table 2 – Structure of pasturable green mass of bean-cereals grass mixture (on the 2nd hay crop)

Grass mixture	Structure of a harvest by years, %												
	1st year of use					4th year of use					6th year of use		
	Grass family	Legumes	including			Grass family	Legumes	including			Grass family	Legumes	including
			lucerne	sainfoin	bird's-foot trefoil			lucerne	sainfoin	bird's-foot trefoil			bird's-foot trefoil
1st grass mixture	54,6	42,2	22,0	20,2	–	60,2	27,4	20,0	7,4	–	73,8	15,0	–
2nd grass mixture	53,9	43,0	30,5	–	12,5	59,5	30,2	12,0	-	18,2	61,8	28,7	20,6
3rd grass mixture	55,8	40,9	–	27,9	13,0	61,4	25,5	–	6,0	19,5	60,6	29,5	29,0
4th grass mixture	56,3	41,3	16,7	15,4	9,2	60,7	33,5	11,0	4,5	18,0	60,8	30,5	22,8