Academic Research in Educational Sciences
ISSN: 2181-1385
DOI: 10.24412/2181-1385-2022-01-95-101

Volume 3 | Special Issue 1 | 2022
Cite-Factor: 0,89 | SIS: 1,12
SJIF: 5,7 | UIF: 6,1

INNOVATIVE APPROACH TO IMPROVEMENT OF ARID PASTURES IN UZBEKISTAN

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ABSTRACT

This paper presents the main results of field experiments to identify the effectiveness of traditional and innovative technologies for improving pastures in Uzbekistan. During the field experiments, field germination, survival, growth dynamics and yield of phytomeliorants were determined in various experimental options. In addition, the impact of the depth of tillage on field germination and plant survival was determined as well.

Keywords: phytomelioration, improvement, shrubs, subshrubs, herbage, strip tillage, resource saving, degradation, combined implement, agrophytocenosis, tillage depth, ratio.

INTRODUCTION

The management system of degraded pastures is one of particular important for present. These soils have low fertility and unsatisfactory agrophysical properties. In order to increase the productivity and improve the condition of these pastures, they some forms of science-based approaches are needed. In the conditions of limited material and technical resources of the arid zone, it is important to use them rationally through the introduction of techniques that would provide the greatest return on costs, help preserve and increase the plant yields, and prevents desertification respectively [1]. Recently, the creation of most acceptable method of phyto-melioration is considered as combined tools for the improvement of pastures, generating agrophytocenoses for different seasons of use based on surface, minimum or strip tillage [2, 3, 4, 5].

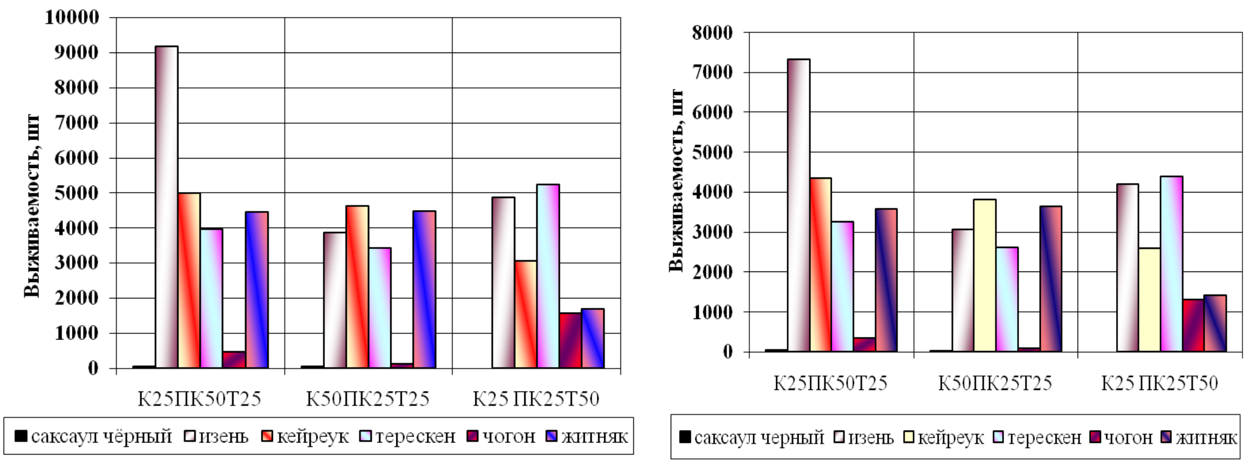
In this context, the research proposed to develop a resource-saving, environmental technology based on the minimum tillage of degraded pastures using phyto-ameliorative plants (shrub, semi-shrub, grass) that enable to prevent pasture degradation and increase the crop yields.

MATERIAL AND METHODS

For the improvements - a degraded area was chosen in the experimental farm of UzNIIKEP, where experimental studies were carried out on the effect of different depths of tillage, the study of various options for creating pasture agrophytocenoses from among shrubs (K), semi-shrubs (PK) and grasses (T). For sowing process - the seeds of shrubs (black saksaul), semi-shrubs (keyreuk, izen, teresken, chogon) and grasses (wheat grass) were sown in various ratios using the developed combined tool based on minimal (strip) tillage and sowing seeds.

RESULTS AND DISCUSSIONS

According to the results of the field experiments, elaborated in (Fig. 1) that the largest number in the community was obtained in the variant of the experiment where the share of participation of shrubs was 25%, semi-shrubs - 50% and grasses - 25%. At the same time, the largest number of plants (9.1-4.9 thousand/ha) falls on the share of such species as Izen, keireuk, teresken. The highest survival rate (98%) is noted in the experimental variant, where shrubs make up 25%, semi-shrubs 25% and grasses 50%.



a) b)

Figure 1. Field germination (a) and survival of phytomeliorants (b) in pasture agrophytocenoses created from various life forms of plants.

The results of the survival of seedlings on the example of Izen was considered. Under the K25PK50T25 variant, plant survival in the first year of vegetation was 80%, while under the $K_{50}PK_{25}T_{25}$ and $K_{25}PK_{25}T_{50}$ options, it did not exceed 79 and 86,5%, respectively, i.e. the best survival rate was obtained at ratios $K_{25}PK_{25}T_{50}$.

The sowing of seeds of desert phytomeliorants against the

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background of various tillage indicates that the depth of tillage significantly affects the indicators of seed germination and plant survival.

As the data described in Table 2, the largest initial abundance and its preservation were noted when tilling the soil to a depth 20 cm, while according to the background of tillage to a depth of 10 and 15 cm, these figures are found somewhat lower.

Table 2 Field germination and survival of phytomeliorants at different depths of tillage with a combined implement. The first-year vegetation period of plants.

Depth of tillage, cm	Phytomeliorant	Seedlings received	preserved plants
10	Black saksaul	0	0
	Keyreuk	$\frac{720}{100}$	$\frac{591.1}{82}$
	Izen	$\frac{4672}{100}$	$\frac{4064}{86.9}$
	Zhitnyak	$\frac{972}{100}$	$\frac{667}{68.7}$
15	Black saksaul	0	0
	Keyreuk	$\frac{1900}{100}$	$\frac{1634}{86}$
	Izen	$\frac{4854}{100}$	$\frac{3834.6}{78.9}$
	Zhitnyak	$\frac{180}{100}$	$\frac{163.8}{91}$
20	Black saksaul	0	0
	Keyreuk	$\frac{2413}{100}$	$\frac{1792.8}{74.2}$
	Izen	$\frac{5320}{100}$	$\frac{4692.2}{88.1}$
	Zhitnyak	$\frac{231}{100}$	$\frac{182.9}{81.5}$

Note: numerator - pcs/ha, denominator - % of preserved plants

The table shows that the survival rate of izen at a tillage depth of 20 cm was 88.1%, and at a tillage depth of 10 and 15 cm, 86,9 and 78,9%, respectively. The highest survival rate of 91% wheatgrass is observed at a processing depth of 15 cm, while in other variants it was 68,7 and 81,5%. In all variants of the tillage depth, black saksaul sprouts were not observed, obviously, due to the poor quality of this batch of seeds.

Most important issues in pasture improvement technology is obtaining a full-fledged herbage of sown phytomeliorants for estroarid desert conditions.

The study of the field germination of phytomeliorants from among shrubs, semi-shrubs and herbs at different depths of their incorporation is the main indicator. In this regard, we conducted research in order to determine the depth of seed placement for their field germination. As evidenced by the data results, relatively high (44-56%) in relation to the control indicators of field germination were obtained in Figure 3.

Figure 2. Seedlings of Izen at a depth of tillage of 20 cm

Seedlings of izen at a soil tillage depth of 20 cm (keyreuk, izen, wheatgrass) of pasture plant species when their seeds are planted to a depth of 1 cm. Somewhat low (30-38%) seed germination rates are noted when seeds are planted to a depth of 2 cm (Figure 2). Due to the low quality of seeds, seedlings on the crops of black saksaul were not recorded.

Among the tested species, the highest field germination of seeds of phyto-ameliorants was highlighted in izen (56%) when planted to a depth of 1 cm, while in other variants it was observed 40-38%.

Let us also consider the influence of various ratios of plant life forms on the growth and development of agrophytocenosis. During the first year of vegetation, the different ratio of life forms of plants did not have a significant effect on the dynamics of their growth. While the height of plants when sowing K_{50}-PK_{25}-T_{25} was: black saksaul - 15.1 cm, izen - 8.6, keireuk - 7.6, teresken - 10.4 cm in May. The same values when sowing K_{25}-PK_{50}-T_{25} and K_{25}-PK_{25}-T_{50} amounted to 13,3 for black saksaul, 10,7-8,9 for izen, 11,2-9,6 for keireuk, 117-10,1 cm for teresken, respectively. (Table 3). It should be noted that the largest period of plant growth falls on the month of July.

However, due to the depletion of moisture reserves plant growth significantly decreased in the future.

Table 3 Growth dynamics of pasture plants in the experiment on creation of pasture agrophytocenoses (sowing at a working depth of 20 cm).

Variant of agrophytocenosis	Plant	Growth dynamics, cm		
		15.05.05	20.07.05	12.09.05
K_{50}-PK_{25}-T_{25}	Black saksaul	15,1	36,2	46,9
	Izen	8,6	27,4	30,8
	Keyreuk	7,6	29,2	34,2
	Teresken	10,4	30,8	36,1
	Chogon	7,7	26,7	38,9
	Zhitnyak	16,2	36,5	46,1
K_{25}-PK_{50}-T_{25}	Black saksaul	13,3	35,6	42,7
	Izen	10,7	29,7	30,8
	Keyreuk	11,2	27,3	34,2
	Teresken	11,7	30,6	36,1
	Chogon	7,2	33,8	38,9
	Zhitnyak	11,8	33,4	43,2
K_{25}-PK_{25}-T_{50}	Black saksaul	0	0	0
	Izen	8,9	25,2	27,3
	Keyreuk	9,6	23,1	26,5
	Teresken	10,1	27,3	29,7
	Chogon	8,3	29,8	30,8
	Zhitnyak	12,3	32,1	44,7

The value of the product obtained per unit area and its quality is the main criterion for the effectiveness of the technology used. Based on this, we will consider the results of studying the yield of fodder mass when creating agrophytocenoses from various life forms of plants.

The yield of plant mass is determined by the density of plant standing, the power of development and the mass of individuals that make up this herbage.

In our experiments, the highest yield (6,77 c/ha) falls on the crops of $K_{25}PK_{50}T_{25}$, while at the ratios of $K_{50}PK_{25}T_{25}$ and $K_{25}PK_{25}T_{50}$, the total yield of forage mass was 5,06 and 4,9 c/ha, respectively (Fig. 3). At the same time, the share of izen was 2,8 c/ha or 41,3% of the total yield.

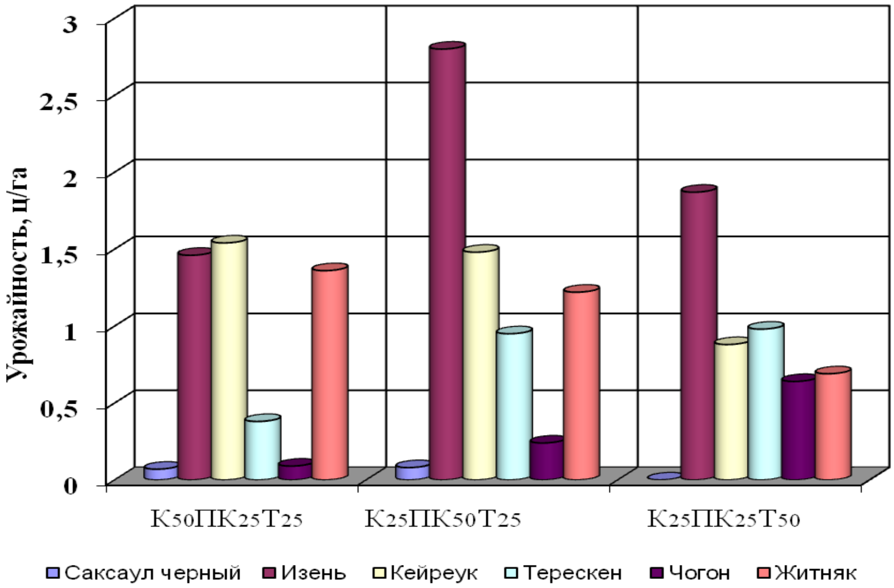

Figure 3. Productivity of fodder plants under the different options of pasture agrophytocenoses

CONCLUSION

Thus, the results of the experiments made it possible to establish that the best indicators of field germination, survival and growth dynamics of pasture plants occur when they are sown at a processing depth of 20 cm. The best field germination of seeds of the phytomeliorants tested by us is observed when their seeds are planted to a depth of 1-2 cm. The yield of fodder mass of each phytomeliorant and in general for the plant community was the largest in the experimental farm of UzNIIKEP – 6,77 c/ha at K_{25} + PK_{50} + T_{25} (shrubs - 25%, semi-shrubs - 50% and grasses - 25%). This is 2-5 times higher than the yield of unimproved natural pastures.

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