

PAPER • OPEN ACCESS

Technical means for collecting seeds of desert-pasture fodder plants

To cite this article: B S Mirzaev *et al* 2023 *IOP Conf. Ser.: Earth Environ. Sci.* **1231** 012007

View the [article online](#) for updates and enhancements.

You may also like

- [Cooling effects of increased green fodder area on native grassland in the northeastern Tibetan Plateau](#)
Wenqi Liu, Yuting Zhou, Jinwei Dong et al.
- [Effectiveness of application of mineral fertilizers in growing food plants in desert pasture conditions of Uzbekistan](#)
N Namozov, B Teshaboev, M Saidova et al.
- [Ecological restoration of fodder productivity of degraded pastures in the foothill desert zone of Central Asia](#)
N Z Shamsutdinov, V V Sanzeev and Z Sh Shamsutdinov



245th ECS Meeting • May 26-30, 2024 • San Francisco, CA

[Learn more & submit!](#)

Present your work at the leading electrochemistry & solid-state science conference.

Network with academic, government, and industry influencers!

Submit abstracts by December 1, 2023



Technical means for collecting seeds of desert-pasture fodder plants

B S Mirzaev¹, Q Tulaganov¹, A Bozorboev¹, Sh X Abdurokhmonov^{1*} and S A Xaziev²

¹National Research University “Tashkent institute of irrigation and agricultural mechanization engineers”, Tashkent, Uzbekistan

²Research Institute of Agricultural Mechanization, Tashkent, Uzbekistan

*E-mail: abduroxmonov.shavkatjon@bk.ru

Abstract. The article presents the analysis of technical means for collecting seeds of desert pasture fodder plants. The type of technical means is chosen and the ways of its improvement are outlined. Information about the machine for implementing the technology is given. The material of the article reflects the specifics of the improvement of arid pastures.

1. Introduction

Today, pasture degradation problems are becoming the most urgent. Degradation turns into a global problem and becomes threatening. The most useful plants fall out of the plant community. Pastures around settlements and wells are overgrown with pasture weeds. Forage productivity of pastures is declining. The main cause of degradation is an excessively large load on the pasture, characterized by the fact that the plants do not have time to inseminate. In other words, there is no self-renewal of the plant community. To assess the nature of degradation, in the first approximation, we take the indicator of productive longevity of pasture plants, taking into account the fact that each plant has its own longevity. In the absence of insemination, the plants, "having outlived their lives", die [1].

Arid (desert and semi-desert) pastures of Uzbekistan, occupying an area of about 21 million hectares, are the food base for astrakhan breeding and desert-pasture animal husbandry in general. It contains camel breeding, horse breeding, cattle breeding, goat breeding. The branch of desert-pasture animal husbandry is kept on natural pastures almost all year round. Pastures, despite their low productivity (2.0–4.0 hundredweight per hectare), with significant fluctuations in productivity over the years and seasons of the year, are considered the cheapest sources of fodder [2-4].

The task of stable development of the industry is the development and improvement of well-known technologies and machines to strengthen the fodder base of livestock. Strengthening the forage base is the restoration of degraded, improvement of low-yielding and narrowly seasonal pastures, including the production of seeds of pasture plants for these purposes [5].

2. The degree of knowledge of the problem

A great contribution to the development of theory, the development and research of technology and harvesting machines for the yield mass of agricultural crops was made by A. Saldatov, V. Sadikov, M. Abdullaev, O. Shavazov, E. Avdeev, R. Alshynbaev, B. Kuybakov, Z. Shamsiddinov, V. Leshko, A. Sadirov, A. Turaboev, A. Mukhammadiev, M. Landsman, V. E. Gavrilov, V. A. Golikov, A. I. Rusanov,



G. D. Terskov, E. E. Ulrichi et al. The research they carried out served as a scientific basis for the creation of reaping and harvesting machines for the harvested mass. It was revealed that during mechanized harvesting of testes, their significant losses are allowed due to easy crumbling [6–7].

For seed harvesting, grain harvesters and pick-ups - choppers are mainly used.

In this case, the combines will be converted accordingly:

- the slats of the reel are increased with elastic material, the whip drum of the threshing apparatus is replaced with a pin drum
- the lower part of the straw walker keys is covered with steel sheet slats

When harvesting seeds with a pick-up grinder, the seed plants are preliminarily mowed into rolls and dried [8–10].

The disadvantage of both machines is damage to the seeds, in the first case - in the threshing part of the combine, in the second - in the chopping drum of the chopper pick-up.

Also known is the “Rotary mower for collecting seeds of desert fodder plants” according to patent No. IAP 06553 registered in the state register of inventions of the Republic of Uzbekistan, in Tashkent on August 19, 2021.

The mower includes a rotor with knives, a deflector, a mesh reflector, a separator with cascaded bladed drums and a storage bin with a bottom equipped with an unloading chute resting on wheels. The blades of the separator drums are involute and are interconnected by a common V-belt or chain transmission.

The disadvantages of the mower are the heavy weight of the metal separator, the complexity of manufacturing the blades of its drums, which are carried out according to the involute, as well as large losses of seeds due to the small clearance between the blades of the drum, due to which the seed heap, not having time to pass through the gaps between them, leaves the surface of the separator. in together with hay in loss [11-12].

It should be clarified here that the seeds of desert-pasture plants are collected in the form of a seed heap, including seeds and a small organic admixture, consisting of inflorescences, crushed leaves and stems, the size of which is close to the size of the seeds.

3. Materials and methods

The development of the technology was based on the results of a critical analysis of known technological methods for their improvement, as well as previous experimental design work on the creation of machines for the implementation of technologies.

The research methodology covered the development of agrotechnical (ATT), initial (IT) requirements for technology, as well as technical specifications (TOR) for a machine for implementing the technology.

The technology parameters and the design parameters of the technical means were substantiated taking into account the conditions of the research object and the results of field experiments. The methodology of work also covered the issues of ensuring the patent purity of the machine being developed.

4. Results and discussion

Taking into account the importance of the problem of mechanization of harvesting seeds of desert fodder plants, according to the initial requirements developed within the framework of the KX-Ateh-2018-229 project, JSC "BMKB-agromash" manufactured a special technical tool for harvesting seed plants of desert-pasture fodder plants (figure 1) . The machine is equipped with an active separating mechanism for the seed heap [13].

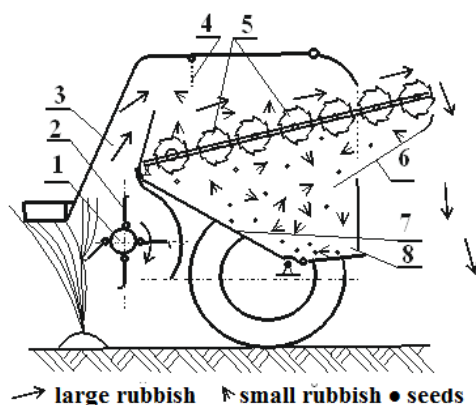


Figure 1. Technological scheme of a technical tool for harvesting testes of desert-pasture plants.

The machine consists of a rotary cutter 1 with hanging knives 2, a deflector 3, a mesh reflector 4, successively installed separating drums 5, hopper trays 6 and 7 of the folding bottom 8.

The separating mechanism is driven by a special hydraulic motor, which makes it possible to vary the speed of the drums within a fairly wide range.

The machine works as follows. With translational movement along the testis, the cutting device cuts off, partially crushes the plants. In this case, the seeds are separated from the stems and, mixed with a heap, reflected from the mesh reflector 4, arrive at the beginning of the separator. Further, due to the rotation of the drums, they move the entire heap along the separator. In the process of moving, seeds and a small heap pass through the passage between the drums into the bunker with a pallet 7, and a large heap in the form of hay is dumped onto the swath [14].

The technological process of such a mower-digger most fully satisfies the process of collecting testes of desert-pasture fodder plants for the following reasons:

- 1) the cutting of plants occurs according to the principle of felling, accompanied by grinding of the cut stems, during which significant dynamic effects arise, leading to the separation of seeds from the plant;
- 2) a mixture of chopped stalk mass and stem elements is transported to the bunker due to inertia forces (shvyrkovy effect) and the air flow created by the rotor through the deflector (pipeline) of the mower;
- 3) the rotary cutter works on the principle of a diametrical fan, due to which air is rarefied in the cut zone, which contributes to the capture and transportation to the hopper of seeds that are separated from the stems during the harvesting process[15].
- 4) by installing a separating and cleaning device in front of the hopper, it is possible to separate a small seed heap from the total organic mass, i.e. carry out the primary cleaning of the seed heap directly in the process of harvesting.

The result of tests on the collection of seeds of desert fodder plants revealed significant advantages of the machine equipped with an active separating mechanism of the seed heap.

A machine with an active separator in comparison with the SK-4 combine. Thus, the completeness of the collection of seeds from the mower was: 68% for the collection of seeds from the harvester versus 25.6% for the combine. Direct costs decreased by 1.4 times for harvesting Izeni seeds. When using a mower, the metal consumption of the technological process has also significantly decreased by 2.5 times when harvesting seeds from the field [16].

As you can see, agrotechnical and technical and economic indicators indicate the feasibility of harvesting seeds of desert fodder plants using a machine equipped with an active separating mechanism.

Agrotechnical indicators of technical means for collecting seed heaps of desert fodder plants fully comply with the terms of reference.

Mastering the production of technical equipment and equipping astrakhan farms with them will make it possible to mechanize the process of harvesting seeds of fodder crops that are promising for improving pastures, which will contribute to the wide deployment of work to improve pastures. [17].

5. Conclusion

The practical implementation of the problems of restoring degraded and improving low-yielding and narrowly seasonal pastures requires the production of a significant amount of seeds of pasture fodder plants, which can be solved by mechanizing their harvesting.

Analysis of the research results indicates the feasibility of developing a technical tool for collecting seeds based on a mower-stacker.

References

- [1] Tulaganov B K and Sadirov A N 2017 Cleaning of seeds of pasture plants II international scientific and practical Internet conference *Cunent ecological state of the environment and scientific and practical aspects of environmental management* pp 2054-8
- [2] Tulaganov B, Mirzaev B, Mamatov F, Rajabov N and Khudaykulov R F 2021 *IOP Conference Series: Earth and Environmental Science* **868(1)** 012062
- [3] Farmonov E, Sadirov A, Berdimuratov P, Tulaganov B and Mirnigmatov B 2019 *I Int. J. Recent Technol. Eng.* **8** 7651-4
- [4] Mirzaev B, Mamatov F, Tulaganov B, Khudayqulov R and Bozorboev A 2021 *E3S Web of Conferences* **264** 0403
- [5] Agkatsev E A 1973 *Selection of the type and justification of the parameters of the separator-comber of perennial rhizomatous weeds* (Moscow)
- [6] Uteпов B, Khaydarov T, Rajabov N, Tulaganov B and Avliyakov M 2023 *E3S Web of Conferences* **365** 04033
- [7] Rafikov A A 1997 *Geoecological monitoring of deserts of Uzbekistan and development of a strategy to combat desertification* (Tashkent)
- [8] Kodirov U, Aldoshin N, Ubaydullayev Sh, Muqimov Z and Tulaganov B 2020 *IOP Conference Series: Materials Science and Engineering* **883(1)** 012143
- [9] Uteпов B, Khaydarov T, Rajabov N, Tulaganov B and Avliyakov M 2023 *E3S Web of Conferences* **365** 04018
- [10] Bekchanov B 1992 *Study and evaluation of the source material of chogon *Halothamnus* for breeding purposes in the conditions of the foothill semi-desert of Uzbekistan* (Tashkent)
- [11] Akhmetov A A, Kambarova D U, Yuldashev A I, Botirov R M and Tulaganov B Q 2022 *IOP Conference Series: Earth and Environmental Science* **1112(1)** 012035
- [12] Leshko V N 1971 *Investigation of the process of collecting teresken seeds by pneumomechanical method* (Moscow)
- [13] Musaev T M 1969 *Research and substantiation of the parameters of the seeding apparatus for sowing seeds of desert fodder plants in the karakul pastures of Uzbekistan* (Tashkent)
- [14] Urdiev S 1974 *Investigation of the technological process of cleaning seeds of desert fodder plants* (Izen, Keyreuk)
- [15] Turabaev A T 1983 *Research of the technological process and substantiation of the parameters of the machine for cleaning the seeds of saxaul, cherkez and chogon* (Tashkent)
- [16] Kuybakov B B 1993 *Substantiation of parameters and operating modes of the machine for post-harvest processing of seeds of desert forage plants* (Izen)
- [17] Shamsutdinov Z S 1975 *Creation of long-term pastures in the arid zone of Central Asia* (Tashkent: FAN)