GRAIN SEEDER DESIGNED FOR DRY SLOPING AREAS

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Abstract. The article presents the shortcomings of the current seeder for sowing grain when used in arable fields, the need for its improvement, the design scheme, structure and technological process of the new seeder.
Keywords. Auger, hill, lalmi, grain, seeder, hole, reel, centner.

As is known, alluvial lands are areas of unirrigated agriculture in the steppe zone. Alluvial farming is widespread in areas with an average annual rainfall of more than 200 mm. In these areas, agronomic measures such as the accumulation and storage of natural moisture in the soil, fertilization, weed control, and prevention of soil erosion are used. Alluvial farming is also of great economic importance because it allows the use of lands that are inconvenient for irrigation. Alluvial lands are a great reserve for expanding irrigated agricultural areas with the creation of irrigation facilities. After the release of water in Tashkent, Samarkand, Jizzakh, and Kashkadarya regions, large areas of alluvial lands were converted into irrigated agricultural areas [1].

According to the State Statistics Committee, in 2017, a total of 322,464 hectares of arable land were cultivated in Uzbekistan, of which 157,606 hectares were wheat and 80,613 hectares were barley. [2].

While the arable land slightly increased in 2018 to 330,659 hectares, in 2019 this figure decreased to 300,025 hectares, or 30,634 hectares. The reason given was low rainfall in these years.

In 2020 and 2021, the arable land in our republic increased again, reaching 323,544 hectares and 339,938 hectares, respectively.

In 2022, the arable land decreased slightly again, and a total of 324,633.3 hectares of agricultural products were sown, of which 133,603.6 hectares were wheat and 86,273 hectares were barley.

Grain is grown in the arable lands of Surkhandarya, Tashkent, Jizzakh, Samarkand and Kashkadarya regions.

In 2017 and 2022, grain was grown on a smaller area - between 2.6 and 5.6 thousand hectares in Surkhandarya and Tashkent regions, while grain was grown on 38.9

thousand hectares in Samarkand region, 35 thousand in Jizzakh region, and about 67 thousand hectares in Kashkadarya region.

In the dryland areas of Samarkand and Kashkadarya regions, mainly wheat was grown, which amounted to 35,656.9 and 63,325.5 hectares in 2021, respectively, while in Jizzakh region, barley was grown on a larger area, which was 63,893 hectares, and wheat was grown on 28,497.1 hectares (Figure 1.3). .

Based on the analysis of the above figures, wheat is grown on more than 133,000 hectares of land, and barley on more than 86,000 hectares. So, the total grain area is 219,000 ha.

From these data, it can be seen that dry lands are suitable for growing cereals, especially wheat.

Currently, the yield obtained from grain crops is 7-15 centners per hectare. However, experiments have proven that if agrotechnical measures are applied in a timely and correct manner, it is possible to obtain 15-25 quintals of grain per hectare of land [3].

Thus, although there are opportunities to obtain high yields from arable lands, the productivity in production is much lower than the potential. Studies have shown that increasing productivity should begin with improving the quality of sowing.

To do this, there must be seeders that fully ensure the sowing of grain, taking into account the slope of the arable lands and its direction. Because currently there are no grain seeders with devices that take into account the specific characteristics of arable lands. The current SZ-3.6 grain seeder is intended for flat fields.

When these seeders are used in arable lands, a disadvantage of the seeder is observed. More precisely, the amount of grain in the bunker on the upper side of the slope decreases and gradually there is no grain on the metering devices, that is, the sowing process is not carried out. Because the grain in the bunker always moves downhill and its surface remains horizontal. The reason is that the grain has a very scattering property and the natural angle of friction (spill) is quite small. As the amount of grain in the bunker decreases, the area of the area that remains unplanted increases. All this leads to a decrease in productivity.

The fact that the grain in the bunker is collected by moving towards the slope and the surface is horizontal is shown in **Figure 1**.

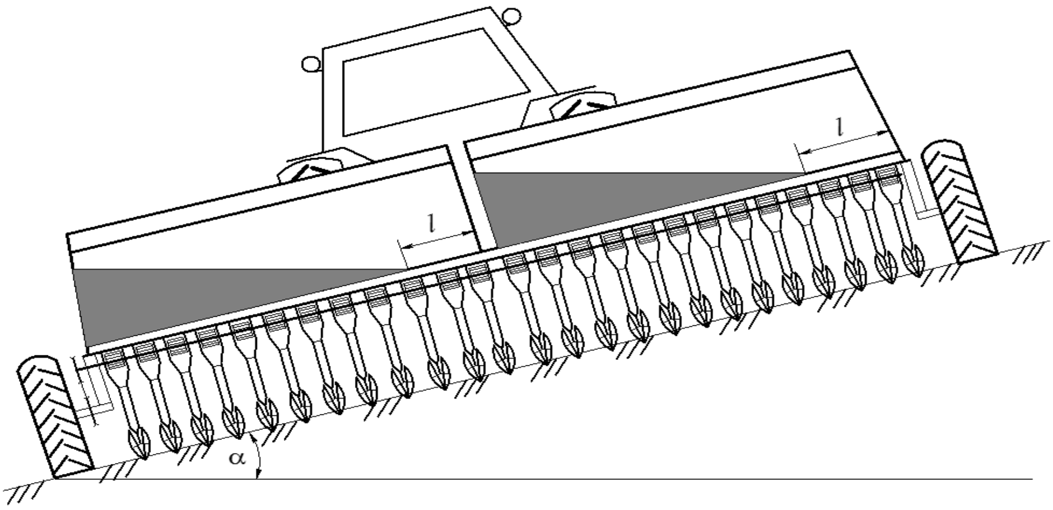

Figure 1. Scheme of the state of grain placement in the bunker during sowing grain in arable land with a SZ-3.6 seeder

In order to eliminate the mentioned shortcoming, the following changes were made to the design of the current grain thresher. The hopper was placed in the middle of the coverage width of the seeder. It was divided into two parts in the transverse plane, and a hole for pouring grain was opened from each part. The seeder is conditionally divided into two parts according to the working width. An auger is installed on each part separately, and it is placed on the gauge (Fig. 2).

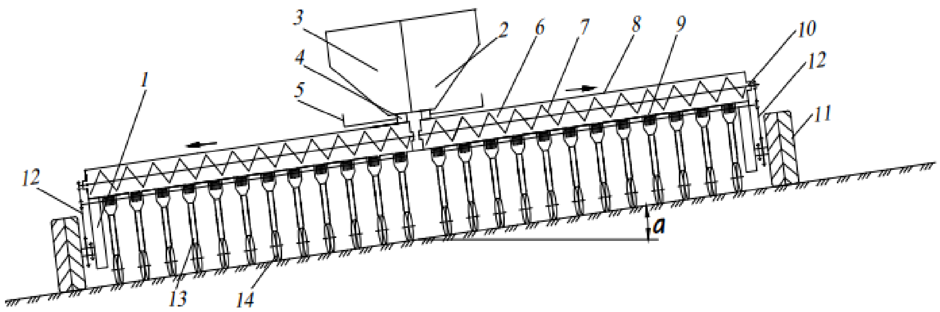

Figure 2. Scheme of the improved seeder

The improved seeder consists of a frame 1, respectively, right and left hoppers 2, 3, a hole 4, a barrier 5, auger shaft 6, auger 7, a casing 8, a metering device 9, a drive gear 10, a support roller 11, a chain drive 12, a seed conveyor 13 and sowing discs 14.

The rotational movement of the auger 7 is provided by a chain drive 12 from the seeder rollers 11.

The hole 4 and the casing 8 are interconnected. The lower part of the casing 8 is fixedly connected to the metering device 9. This design ensures that the grain in the hopper falls into the metering device. Since the gap between the auger 7 and the metering device body 9 is smaller than the thickness of the wheat, grain damage is prevented.

The specified planting rate is provided by changing the number of rotations of the hole surface 4 and the corresponding screw 8. Changing the number of revolutions of the auger is done through the chain transmission 12.

The working width of the used SZ-3,6 and improved seeders is the same.

The technological workflow of the improved seeder is presented in Figure 3.

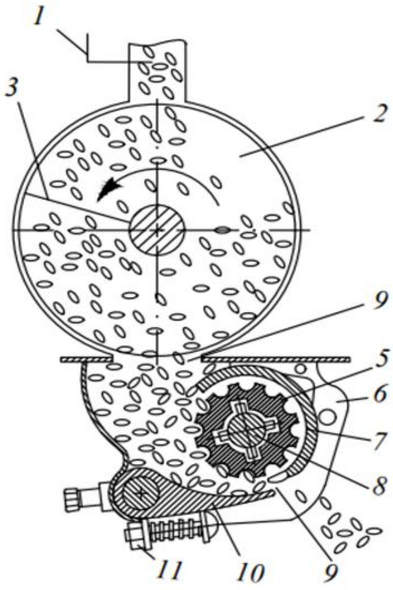

Figure 3. Schematic of the technological workflow of the improved seeder

When the machine is started, the grain in the hopper (not shown in the figure) falls into the auger 3 in the amount determined by the barrier 1 through the hole. The auger 3 delivers the grain through the hole 4 to the metering devices. From there, the seed is fed to the sowing discs by means of the seed conveyors and is sown.

The metering device consists of a roller 5, a housing 6, a bushing 7, a roller shaft 8, a stud 9, a base 10 and an adjusting screw 11. The design and technological process of the metering device in the improved seeder have not been changed [4].

The improved seeder ensures high-quality sowing regardless of the slope and the amount of grain in the hopper. Because the auger forcibly delivers the specified amount of grain to each metering device.

In conclusion, it can be said that in order to increase grain yield in arable lands, it is necessary to ensure the completeness of sowing and improve its quality. For this, it is necessary to provide metering devices with a fixed amount of grain. This, in turn, requires the improvement of existing seeders.

LITERATURE

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