# INNOVATIVE TECHNOLOGY OF SOWING IRRIGATED CEREALS, PROVIDING RATIONAL USE OF LAND AND ECONOMIC RESOURCES

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## Abstract

The article describes the irrigated winter grain state and technology cultivation in Uzbekistan. It was carried out a comparative analysis of grain continuous bed sowing efficiency in rows with respect to traditional sowing. The row-sowing method innovative technology of sowing in the beds was recommended, which ensures land resources conservation, an increase in yield and a decrease in material costs.

**Key words:** sowing, grain seeds, innovative technology, bed method, combined seeder, conservation, resource, harvest**.**

## Introduction

Due to the limited cultivated areas and fertile lands in Uzbekistan, currently cultivated on 1.1 million hectares of winter crops on irrigated lands, about 70% of grain is placed on cotton-grain crop rotations after the raw cotton harvest, and the remaining 30% on open areas freed from other crops. Therefore, taking into account the possibly unfavorable autumn weather in Uzbekistan, it is necessary to complete the sowing season as soon as possible after the raw cotton harvest (on average, from September 20 to October 15). At the same time, as a rule, it will be provided by farmers to use the best possible sowing techniques to ensure maximum yield.

It is known that in grain growing, an increase in yield and gross grain yield is achieved by using calibrated high-yielding grain varieties on irrigated lands for sowing, highly efficient technologies and equipment for soil cultivation and sowing, which provide optimal conditions for favorable growth, development, and plants tillering, as well as protection them from frost during wintering and in summer during the waxy period from heat [1]. From this point of view, when carrying out cotton-grain crop rotations, farmers try to clear the fields from the remnants of cotton (guzapai) in order to thoroughly prepare them for presowing treatment. However, to cleanse fields from cotton residues, i.e. Removing guzapai requires grubbing, forklifts, vehicles and additional labor, fuel and other costs. To avoid these costs, cereal sowing is carried out in aisles with cotton residues, i.e. to the fields with the guzapaya. However, due to the lack of special equipment designed for sowing grain between rows with cotton plants remnants and on open areas with irrigation furrows simultaneous cutting, cereals sowing is still carried out using ineffective technical means. More precisely, in the

fields with guzapaya and open areas, the seeds are distributed in a scattered way, mainly using a mineral fertilizer spreader of NRU-0,5 type, and then the seeds are sealed, that is, they are mixed with the soil when cutting irrigation furrows with the cultivator furrow cutters. The result is a bed in an equilateral trapezoid form. In this case, the seeds that are in the formed furrow zone under the furrow cutter influence move to the bed ridges (Fig. 1, a and bridge sowing technology is in practice. The use of such a sowing technology does not meet agro technical requirements, the seeds distribution uniformity over the field surface and their placement in depth are disturbed, that is, a certain part of the seeds remains unseeded on the field surface, and some of the seeds fall to 10-14 cm depth and do not sprout. This leads to significant losses of both seed material and to a decrease in the gross yield. And also the sowing processes are carried out with a double pass of the units. This increases material costs.

**Purpose**

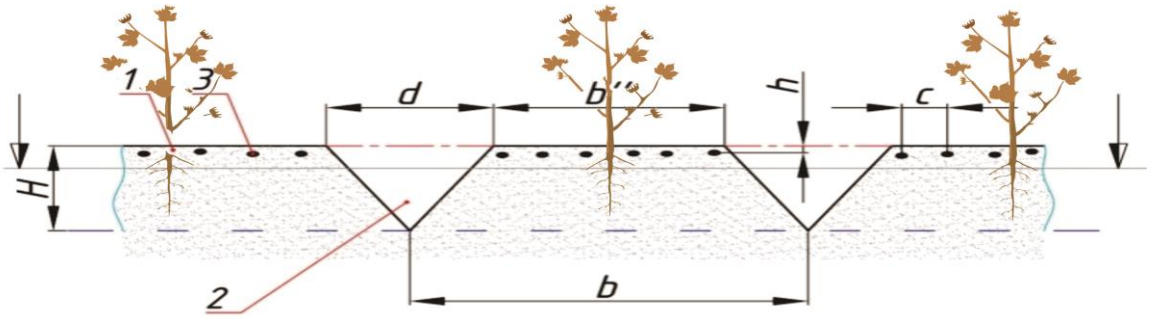
To date, the seeders special design and the technology lack of an sowing effective method in fields with guzapaya and open areas irrigated with cereal crops leads to the above disadvantages, causing significant economic damage to the country's agricultural sector. Consequently, for irrigated fields with guzapaya and open areas, an effective innovative technology development for sowing seeds is required.

**Tasks**

According to agrotechnical requirements, it is necessary to make grain uniform sowing to 3-5 cm depth with an optimal rate. With this winter cereals cultivation technology, firstly, due to the tillering nodes formation at 3-5 cm depth, the number of stems increases, secondly, the plants resistance to frost in winter and to a possible high temperature in the summer during the wax period increases, the grains grain size in the ear improves and the grain yield increases[2].

**Materials**

When using the sowing existing methods, not only the seeds uniform distribution in the cotton aisles and open areas is not ensured, but also their seeding to the required depth and the field's useful area use degree remains low due to the poor-quality irrigation furrows formation. That is, with this method, for irrigation, beds are conditionally formed in the form of an equilateral trapezoid with the help of cotton cultivator hillers or other converted technical means (Fig. 1, a and b).




a)

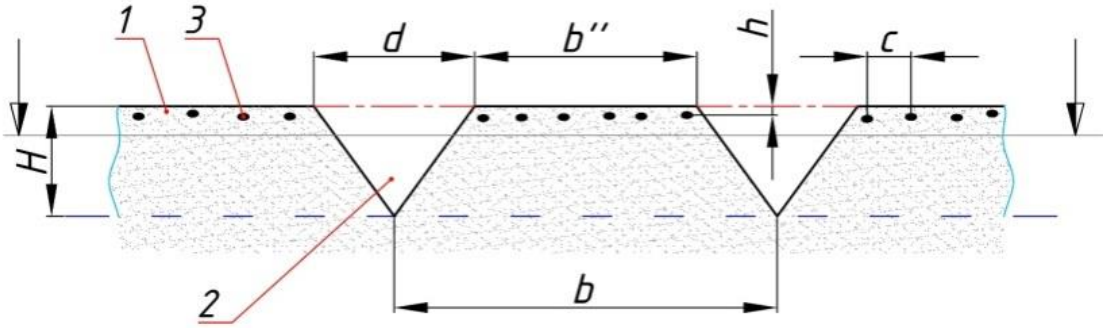



Fig.1. Schematic diagram of seeds traditional sowing in cotton aisles (a) and in open areas. (b)

1 - bed ledges; 2 - irrigation furrow; 3 - seeds; d - the irrigation furrow width; b ″ - bed ledge width; b - bed width; c - distance between the grains.

It should be noted that in recent years, a similar technology of bed sowing of grain crops in such countries as Mexico, Syria, Pakistan, Indonesia, USA, Canada and other countries has been gaining some popularity. It occupies from 2 to 18% of irrigated open areas, where crops are sown according to the above scheme (Fig. 1, b)). At the same time, the advantage of bed sowing in terms of saving seeds and increasing yields is noted. A similar technology of ridge sowing is also practiced among the CIS countries, except for Uzbekistan, in Kazakhstan, Kyrgyzstan, Azerbaijan and Tajikistan [3; 4; 5].

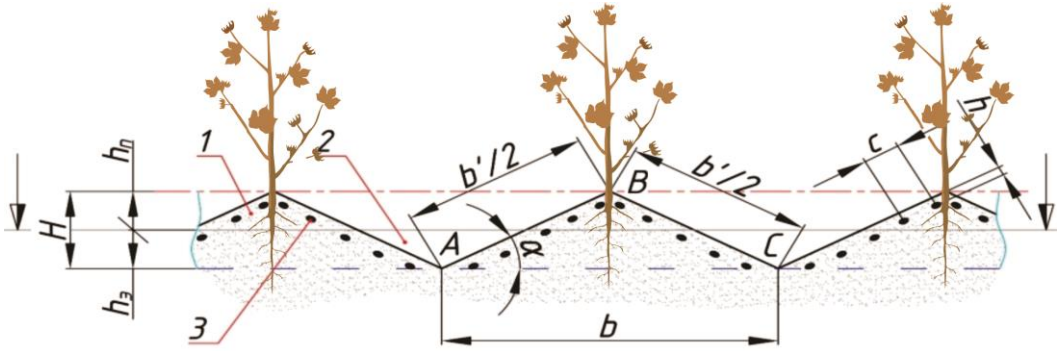
When using this technology of sowing grain, i.e. when forming a bed of length L and width b, the sowing area $F_1$ will be:

$$F_1 = (b - d) \cdot L. \quad (1)$$

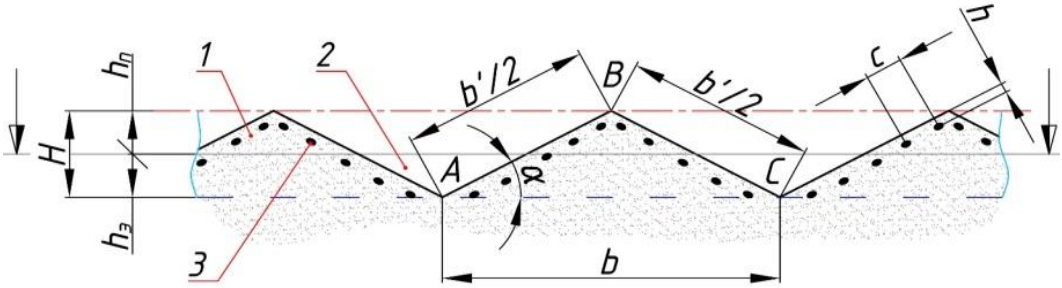
However, when using the method of sowing cereals, this technology leads, in addition to deteriorating the quality of sowing, and to a decrease in the degree of use of land resources, i.e. a part of the area remains free from sowing - $F_d = d \cdot L$, which contributes to the clogging of irrigation furrows by weeds and clogging by weeds of this grain field.

## Research Methods and Results

In this regard, instead of such a traditional technology for sowing cereals, an effective technology for the formation of beds and a method of sowing seeds in rows in the aisles of cotton was recommended, as well as in open areas (Fig. 2, a and b).




а)




б)

Fig. 2. Schematic diagram of the recommended sowing of seeds in cotton aisles (a) and in open areas. (b) 1 - bed ledge; 2 - row spacing (irrigation bed formed by a special hiller); 3 - seeds; b - row spacing; b′/2 - width of the side slope of the bed; α - angle of the side slope of the bed; c - the distance between the grains (when sowing with a special seeder); h - sowing depth; H - bed height (depth); $h_э$ - the depth of the furrow; $h_п$ - the height of the bed ledge.

In this case, that is, the bed sowing method according to the recommended technological scheme is carried out as follows: in the aisle of cotton or in an open area, a bed is formed with a special furrow cutter, the cross section of which looks like an equilateral triangle ABC, and the sides are located at an angle α relative to the base b. On the lateral sides of the bed, at equal distances C and to h depth, the seeds are sown in grain rows. Then, the sown area of one bed $F_2$ will be equal to:

$$F_2 = L \cdot \left( \frac{b'}{2} + \frac{b'}{2} \right) = b' \cdot L \qquad (2)$$

where L is bed length.

It follows from the diagrams in Fig. 2 that

$$b' = \frac{b}{\cos \alpha}.$$

With this in mind

$$F_2 = L \cdot \frac{b}{\cos \alpha}. \quad (3)$$

It can be seen from this expression that the sowing method according to the recommended technology makes it possible to rationally use land resources by sowing seeds in rows on the surface of the garden bed. At the same time, the coefficient of use of the field area for placement and distribution of seeds in comparison with the usual traditional sowing technology will be:

$$f = \frac{b}{(b-d)\cos\alpha}. \quad (4)$$

It follows that the utilization factor of the field area with the recommended technology will be more than one

$$f>1. \quad (5)$$

This proves that the new technology is more effective than the existing technology in the method of sowing seeds on open areas and in the aisles of cotton.

To implement this technology in practice, a special design of a combined seeder was developed [6], which is designed to provide in one pass the formation of beds with smooth surfaces for sowing seeds along the furrows and ridges of the beds and rolling the sown seeds into the soil.

## Conclusions

The above recommended technology of the row sowing method in the aisles and in open areas can be attributed to an innovative resource-saving technology for the cultivation of grain crops, because the use of this technology helps to increase the nutritive areas of the plant due to the method of sowing seeds along the surfaces of the furrow and ridges of the bed, thereby increasing the area sowing up to 20-35% and reducing losses of expensive seed material up to 20-30% during sowing, providing ATT, as well as obtaining higher quality yields. This technology of the row method of sowing grain in the beds is carried out by a special combined seeder, which simultaneously in one pass cutting irrigation furrows, forming the beds and sowing seeds along the furrows and ledges of the beds in beds. Thus, saving of fuel and lubricants and other material costs is achieved.

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