Developing the innovative method of processing and sowing cotton seeds

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Abstract. One of the most important tasks of cotton cultivation is to develop advanced technology of precise cotton seeding. Laboratory and field methods, precise sowing methods, P. Fisher's method of dispersion, and B.A. Dospehov's method were used. In our country today, cotton sowing uses a "white seed" that has not been completely naked. As a result of the research, when using fluffy white seeds, sowing can only be done in rows, up to 120 kg of seeds are needed per hectare, after sowing, thinning is required, and because the seeds fluff is not removed seeds germinate over a long period of time, for this reason it requires excessive amount of seeds and manual labor which lead to higher costs. Therefore, improving the technology of cotton cultivation is one of the most important issues. Based on this, we have carried out research on the development of innovative technology for precise sowing of cotton seeds in Turkmenistan using innovative technology. According to the study, the best results in terms of germination, weight and overall yield of cotton in one of the investigated seeds were chemically removed, 25 kg of seeds per hectare were planted in a precise manner, and such seeds were exposed on short-wave electromagnetic rays. Seeds obtained using such methods are significantly different from the performance of fluffy seeds. According to the results of laboratory research and field experiments, agrotechnical rules have been improved to achieve the appropriate density of cotton. Implementing the results of the work will help to increase the average yield per hectare by 25-30% per hectare in the country's cotton industry, reduce the consumption of cotton seeds by 4-5 times, reduce the work of thinning by 70-80%, reduce the amount of manual labor, and ensure efficient use of land and water.

1 Introduction

Cotton is an important crop of Turkmen agriculture. According to scientific data, more than 150 different types of fiber are produced from the cotton crop - cotton fiber and seeds [4, 6]. Cotton fiber serves as the main raw material for the textile industry, and various clothes are made from it. In addition to fabrics for outer and underwear clothes from cotton fiber, cotton is used to make such products as sewing threads, yarns in different color and density,

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fishing nets, moving cords, ribbons used in shipping, filters, artificial silk, medical cotton and many other products [1, 4-6, 12].

P.M. Zhukovskiy and N. K. Nadezhdin [3], and S. Orunov [11] note that the speed of germination of seeds without fluff better results than that compared to fluffy seeds.

The biological significance of the fluff of the cotton seeds is considered to be not scientifically substantiated. Fiber and fluff cannot be intended for wind dispersal, as it has almost no aerodynamic sailing. Some scientists believe that fiber and fluff serves as a protection. According to F.M. Mauer [3-4], when seeds are too wet, at particularly low temperatures - the fluff create a favorable environment for the seed to dry, and it retains its germination until the conditions arise. He goes on to say that the biological essence of fluff is to facilitate the division and germination of seed components.

A.K. Orujev and Kuliyev [4, 6] found that naked seeds had higher germination energy than fluffy seeds. The last of the named seeds absorbed 29.14% water at + 10 ° C in the first 4 hours, while the naked seeds absorbed -37.64% water. As the water temperature rises, the germination of both seeds increases, but the naked seeds absorb moisture in a short time.

D. Werderowskiy [4, 6, 13] has studied the method of removing fluff from sowing seeds by nitric acid. He determined that the speed of cleaning seeds from fluff depends on temperature. The higher the heat of the seed, the better the fluff cleans. He noted that when the seeds are treated with nitric acid, their germination capacity and growth increase. However, it should be noted that the scientist's work is very acidic and because of its adverse effects have not been found in manufacturing, it is used only for seed preparation in the experimental method.

Processing cotton seed by sulfuric acid is considered to be a promising method. In A. Vilnius's work [4, 6] it is noted that the cotton seeds fluff is removed with the help of sulfuric acid. According to him, the processing of cotton seeds by sulfuric acid was first used by Professor Taylor in the United States in the 1980s.

In order to accelerate the germination and increase growth of the cotton seed, the seed fluff was removed.

The reasons for the slow implementation of precise sowing into production are, according to the scientist, firstly due to the negligence of the heads and specialists of the households, and secondly, the poor quality of mechanically processing of the seed for sowing [9, 10, 15-16].

In many studies, the importance of dense and sequential placement of plants is determined by its productivity and the possibility of simultaneous mass opening of stocks. An increase in the number of plants in a socket leads to a decrease in the number of stocks, a cotton weight of a stock decreases, and the technological properties of the fiber are reduced [9].

When developing the exact sowing technology, there was no long-term consensus among the researchers as to how much seed should be given to each nesting device in order to reduce seed consumption, reduce the cost of isolation, and achieve effective crop density [6, 9, 15-16].

As has been established in many experiments, the practice of sowing seeds in a socket has a significant effect on the seed germination. The results of the tests are contradictory. This is because the tests are carried out in different soil and climatic conditions, as well as with the help of machinery [9-10].

In the precise sowing test of Y.Vasilyev (1969) were compared two ways of sowing: 60X22.5-linear sowing 3 seeds per socket and 60X30- linear sowing 4 seeds per socket, the total density of 60X30-linear sowing is 126.6 thousand / ha and of 60X22.5 linear sowing is higher 153.2 thousand/ha.

But 2- and 3-seed sockets which do not require full-fledged thinning show that they 60X30 linear sowing methods are higher (62%) than the 60X22.5-linear sowing (51.5%) [9, 10, 16].

Scientific research on the mechanical cleaning of fluff of seeds of medium and fine fiber varieties of cotton in soil and climatic conditions of Turkmenistan we can met in the works of Y.Durdyyev (1963), D. Agakishiyev (1965-1968) and T.Annagulyyev [5]. T. Annagulyyev (1973-1980) tested in experimental and field conditions the fine-fiber varieties 8763-Yo and 9041-Yo, mechanically removing the cotton seed fluff and, sorting it by weight, calibrating it and testing it in production. Cotton growers note that in the southern zone of Turkmenistan, cotton is growth well when it sowed until April 5 and in the northern zone after April 5; that it is possible to get a rich cotton crop in a timely and high-quality execution of agro technical measures without thinning the sockets.

Although several methods of seed preparation and sowing have been tested to present time, method using chemically remove of the fluff of the seed and sow 25 kg of seeds per hectare has not been used.

2 Materials and methods

Increasing cotton yields is closely related to regular sowing using good quality seeds in sowing. In our country today, cotton sowing uses a "white seed" that has not been completely naked. As a result of the research, when using fluffy white seeds, sowing can only be done in rows, up to 120 kg of seeds are needed per hectare, after sowing, thinning is required, and because the seeds fluff is not removed seeds germinate over a long period of time, for this reason it requires excessive amount of seeds and manual labor which lead to higher costs. Therefore, improving the technology of cotton cultivation is one of the most important issues.

Based on this, we have carried out research on the development of innovative technology for precise sowing of cotton seeds in Turkmenistan using innovative technology.

By type of seeds:

- Regular cotton seed (control).
- Mechanically stripped cotton seeds (test).
- Chemically stripped cotton seed (test)

a) b) ç)

Fig. 1. Cotton seeds prepared for planting.

When the seeds of the medium-fiber cotton variety Jeyhun have been cleaned of fluff, it becomes possible to plant seeds in a strictly defined quantity and save seeds; there is no need to thin the seedlings. When the seeds are exposed to short-range electromagnetic rays, the power of germination and growth of the seed increases by 8-10%, the naked seeds germinate earlier than the seeds with fluff by 3-4 days; the seeds were chemically cleaned of fluff and sorted by size and weight. The selected high-quality seeds were energized by

short-range electromagnetic rays on the RKES-1 device, and the seed germination was determined in the laboratory (Figure 2).

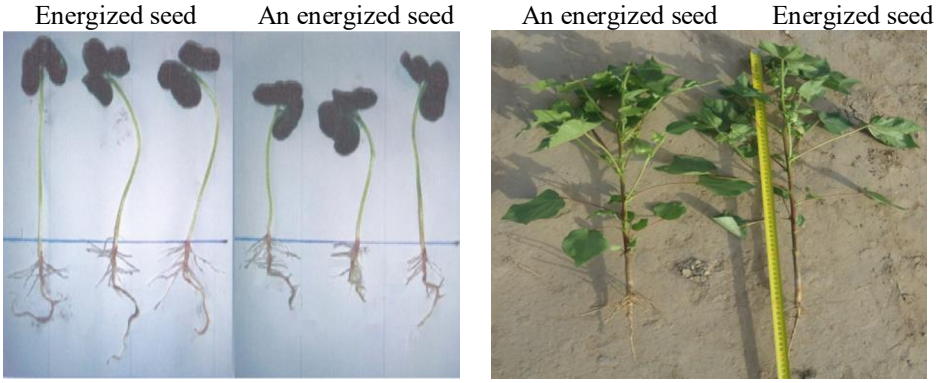

Fig. 2. The influence of the energy of the RKES-1 apparatus on the roots and stems of cotton.

Based on the data presented, in the research work common fluffy seeds (120 kg/ha), the mechanically naked seeds (25k g/ha), the chemically naked seeds and the energized by short-range electromagnetic rays seeds were experimentally tested and sowed using different sowing methods (15, 25, 45, 50 kg/ha) and the method of sowing under 2 rows of biofilms.

According to the results of 2016-2018, when the common seeds were used 120 kg/ha in production, the cotton height was 83.3 cm, the number of buds and flowers was 0.8, the number of stocks was 10.5 and the yield was 1.9%. In this method, the weight of cotton in one stock was 5.1 g. When the mechanically naked seeds were sown 25 kg/ha, the cotton height was 81.6 cm and the number of buds and flowers was 0.6. The number of stocks is 10.5 and the opening is 1.8%. In this way, the weight of cotton in a cotton stock was 5.1 g. When chemically naked seeds were used 25 kg/ha, the cotton height was 84.1 cm, the number of buds was 0.8, and the number of flowers was 0.4. The number of stocks is 10.8 and the opening rate is 2.4%. In this method, the weight of cotton in a stock was 5.5 g. When chemically naked seeds were sowed 50 kg/ha, cotton was recorded at 81.3 cm in height. In this method the number of buds was 0.5 and the number of flowers was 0.1.The number of stocks is 10.9% and the opening is 2.3%. In this way, the weight of cotton in a cotton stock was 5.3 g. Cotton was recorded at 82.9 cm in height when chemically naked seeds were used 15 kg/ha. In this method, the number of buds was 0.4 and the number of flowers was 0.1. The number of stocks is 10.9% and the opening is 2.4%. In this way, the weight of cotton in a cotton ball was 5.3 g.

Cotton was recorded at a distance of 92 cm when sowing 25 kg/ha of seed, which was chemically naked and exposed to short-wave radiation. In this method, the number of buds was 1.6 and the number of flowers was 0.6. The number of stocks is 13.9 and the opening rate is 3.5%. In this method, the weight of cotton in a cotton stock was 6 g. When the seed was chemically removed, 45 kg/ha of seeds were sown under 2 rows of biofilm, the height of the cotton was 92.7cm, the number of buds was 1.4 and the number of flowers was 0.9. The number of stocks was 14.1 and the opening rate was 3.9%. In this way, the weight of cotton in a cotton stock was 6.2 g.

The sum of the obtained data shows that the average annual cotton crop sowing rate (fluffy seed) is 33.7 s/ha, when the chemically naked exposed on short-wave radiation seeds were sowed expending 25 kg/ha, the total and additional yields were 40.9 and 7.2 s/ha respectively. When the chemically naked seeds were sowed under 2 rows of biofilms

expending 25 kg/ha, the total and additional yields of cotton were 47.3 and 13.6 s/ha respectively.

Under common rules sowing rate of fluffy seeds is 120 kilograms per hectare, an average yield of 33.7 centners per hectare could be harvested in three years.

Fully meeting the above conditions, chemically naked seeds were sowed expending 15, 25, 50 kg of seeds per hectare, the average yield was 34.1 s/ha, 38.7 s/ha and 35.2 s/ha respectively; additional yield was 0.5 s/ha; 5 s/ha and 1.5 s/ ha were respectively.

The main error of the experiment (YKDT0s) was 0.60 s/ha or 6.12%, and the additional cotton yield in the experimental methods reached 7.2-13.6 s/ha or 21.9-41.8%. and significantly differentiated from the error of the experiment. Therefore, the additional cotton harvest from the test methods has been proven to be reliable and true.

As a result of field experiments, it is scientifically proved that when the seed was prepared and sown according to different sowing methods, when in sowing were used chemically naked exposed on short-wave radiation seeds expending 25 kg/ha, the average yield was of 40.9 s/ha, more than 7.2 centners per hectare when using common seeds. As a result, the net income was 5229.06 manat and the surplus was 1041.52 manat, the surplus was 577.2% and the productivity was 6.77 manat, and it is scientifically proved that when saving 95 kg of seeds per hectare, the total amount of saved seeds from 620 thousand hectares in Turkmenistan was 58900 tones. An average yield of 47.3 s/ha was obtained when 45 kg of chemically naked seeds were sown under 2 rows of biofilms, It was scientifically proved that yielding is more than the usual sowing by 13.6 centners, resulting in a net profit of 6046.29 manats and a surplus 3405.49 manats, profitability 576,55% and the cost price of the product is 6.76 manat, which is significantly different from other types of the research.

3 Results and Discussion

It has been found that the germination rate is low due to the inability of the cotton seed to be selected and sorted when it is fluffy, but the germination rate is increased due to the regular selection of the naked seed.

- It has been developed requirements for increasing germination and yield of seeds by exposing them to microwaves.
- It has been found that with a row planting of seeds with fluff, seeds are consumed excessively, however, since naked seeds are planted exactly, they can be saved.
- Cotton seeds are sown exactly by spending the seeds in different ways, and the most convenient rule has been found out.
- Due to the late arrival of spring in the northern part of the country, early germination has been found and proposed for production when sown under two rows of films.
- Innovative method of precise sowing in cotton cultivation in agriculture of Turkmenistan has been developed.

4 Conclusion

In general, based on the results of scientific research, a special plant for the chemically naked seeds has been built in Ahal, Mary, Lebap and Dashoguz regions of the country thanks to the unprecedented efforts of the President. Hundreds of John Deere 6175M telemetry tractors and MONOSEM digital system tractors and GASPARDO precision sowers were also purchased and introduced into agriculture in Turkmenistan in 2020. When the work is done on the ground through a digital system, the agro technical work, which is carried out from the sowing to the harvest, can be fully controlled. The sharing of new

technologies and innovations among the developed countries of the world is leading to a qualitative increase in the work carried out in the sectors. It also has a positive impact on the strengthening of friendly and fraternal relations between the two countries.

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