*УДК* **631. 312. 633**

# RESEARCH OF THE INFLUENCE OF SEEDS PLANTED UNDER FILM ON THE THICKNESS AND YIELD OF SEEDLINGS.

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**Abstract.** In this article, a number of scientists studied the thickness of seedlings planted under film, its effect on plant growth and productivity, the advantages of agricultural technology for sowing seeds under film under research conditions, and presented the effect on yield.

**Keywords.** Seed, cotton, cotton, seedling number, under film, seed, cotton yield, agrotechnical measure, mulch, herbicide, plow layer, weeds, soil surface.

# ИССЛЕДОВАНИЕ ВЛИЯНИЯ СЕМЯН, ВЫСАЖЕННЫХ ПОД ПЛЕНКОЙ, НА ТОЛЩИНУ И УРОЖАЙНОСТЬ РАССАДЫ.

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**Аннотация.** В данной статье ряд ученых изучили толщину всходов семян, посаженных под пленку, ее влияние на рост и продуктивность растений, преимущества агротехники посева семян под пленку в условиях исследований и представили влияние на урожайность.

**Ключевые слова.** Семена, хлопок, хлопок, толщина всходов, под пленкой, урожайность хлопка, агротехнические мероприятия, мульча, гербицид, верхний слой, сорняки, поверхность почвы

Ensuring an abundant and early high-quality cotton yield is considered one of the fundamental priorities of the cotton-growing sector in our country. However, the onset of the cotton-seed sowing period coincides with spring months characterized by high precipitation. Excessive rainfall often leads to delays in sowing operations and may cause seed rotting, soil crust formation, and a substantial reduction in seedling emergence in sown areas. These factors ultimately result in a significant decline in cotton productivity.

To mitigate these challenges, the technology of **sowing cotton seeds under plastic mulch** has proven to be highly effective. This approach provides several agronomic advantages, including:

- the possibility of ultra-early sowing;
- reliable protection against soil crust formation;

- ensuring optimal and uniform seedling density;
- increased efficiency in the use of irrigation water and mineral fertilizers;
- obtaining earlier and higher cotton yields.

Due to these advantages, the plastic-mulch sowing technology demonstrates clear superiority compared to conventional open-field sowing methods.

A number of experiments tailored to specific soil and climatic conditions have been conducted both in our country and abroad on the technology of cultivating cotton by sowing seeds under plastic mulch, and these studies have yielded effective results. This technology has been widely applied for many years in the agricultural sectors of countries such as China, Greece, and Spain.

Research carried out in Uzbekistan on cotton cultivation under plastic mulch has also demonstrated positive outcomes, leading to its large-scale introduction in the Andijan region. Subsequently, the technology began to be implemented across the entire country.

On 22 November 1996, the Cabinet of Ministers of the Republic of Uzbekistan adopted Resolution No. 410, titled *“On Measures for Cultivating Cotton Under Plastic Film,”* which elevated this technology to the level of state policy. Following this decree, the method of sowing cotton seeds under plastic mulch began to be widely implemented across agricultural lands.[1].

As a result of the large-scale introduction of the cotton-seed sowing technology under plastic mulch, the average cotton yield in the Republic reached 33.4 centners per hectare in 1997, which was 10.4 centners per hectare higher than the yield obtained through conventional cultivation methods.

A number of researchers have conducted studies on plant density, fertilizer application norms, and agrotechnical measures used in cotton fields cultivated under plastic mulch, and have obtained positive conclusions.

In particular, studies conducted by N. G. Zakharov and G. G. Semikina (1964) examined the effectiveness of mulching soil with black glossy polyethylene film. Their results showed that while soil crust thickness reached 3–5 cm in the control treatment, no crust formation was observed under polyethylene mulch. Cotton yield reached 39.9 centners per hectare under the mulch treatment, whereas the control variant produced only 18.2 centners per hectare [2,3].

According to the findings of Sh. T. Kholikulov (1977), covering the soil surface increases the concentration of carbon dioxide in the soil air. The processes of carbon dioxide formation and oxygen consumption are largely dependent on soil temperature. Covering the soil with various materials reduces soil erosion; when mulching is applied, soil erosion decreases by up to 0.89 tons per hectare. The use of mulch prevents the leaching of mobile forms of nitrogen, phosphorus, and potassium elements with irrigation water, enhances the soil’s water absorption capacity, and contributes to an increase in humus content.

According to the experiments conducted by S. Bakhromov (2007), the cotton yield in the treatment without plastic mulch and without herbicide application amounted to 30 centners per hectare, whereas the mulch-only variant (without herbicide) produced 35.4 centners per hectare. When cotton seeds were sown under plastic mulch and herbicides were applied—1.5 kg of Stomp during the growing period—the yield reached 40.6 centners per hectare. Based on these results, Bakhromov emphasized the necessity of chemical weed control when using the plastic-mulch sowing method [2].

Experiments carried out by T. Ya. Rajabov and T. Rajabov under the conditions of the Karshi steppe (2007) showed that cotton grown on non-mulched fields yielded 33.4 centners per hectare, while sowing seeds under plastic mulch increased yields to 41.0 centners per hectare. According to their findings, mulching improved the soil's hydro-physical properties, conserved reserve moisture, reduced the mineralization rate of groundwater, prevented the accumulation of harmful salts in the plow and subsoil layers, accelerated cotton maturity, and ensured high-quality yields [3,4,5].

Based on the experiments conducted by F. M. Hasanova and Sh. T. Salamov (2006), it was determined that when 25–50% of the nitrogen fertilizer is applied simultaneously with seed sowing under plastic mulch and the remaining portion is supplied during the growing season, it positively influences the maturity of cotton and facilitates timely harvesting.

Similar results were obtained by F. Hasanova and T. Rajabov when studying the technology in the takyr soils of the Karshi steppe. When NPK fertilizers were applied at a ratio of 200:140:100, with 50% of nitrogen applied before plowing and the rest during sowing, at the true-leaf stage, squaring, and flowering phases, mulched plots produced up to 52 centners per hectare, compared to 36.9 centners per hectare in the open-field control variant.

In the studies carried out by B. To'xtashev (1998), it was observed that seeds sown under plastic mulch germinate more quickly, seedlings emerge uniformly, and plants develop more vigorously. In mulched conditions, the bolls formed on the lower and middle fruiting branches were well-developed, of higher fiber strength, and had greater individual boll weight—mainly due to the favorable microenvironment created under the mulch [6].

Covering a portion of the field surface with plastic film reduces evaporation losses and decreases irrigation requirements compared to conventional open-field sowing.

Experiments conducted by G. A. Bezborodov and M. N. Toshmatov (2003–2005) under the heavy loamy, typical gray soils of Tashkent region showed that cotton was irrigated 8 times in the control variant, whereas the mulched plots required only 7 irrigations during the growing season. The seasonal irrigation rate in the control plots was 3910 $m^3$/ha, while mulched plots required 3410 $m^3$/ha. In 2004, the control received 3210 $m^3$/ha over six irrigations, whereas mulched plots required only 2185 $m^3$/ha. In 2005, the control plots were irrigated seven times (4380 $m^3$/ha), compared to 3940 $m^3$/ha in the mulched plots.

According to the results, cotton yield in mulched plots reached 39.0 centners per hectare, with an additional 7.5–9.6 centners gained relative to the control. The water consumption per centner of cotton was 125.6 $m^3$/ha in the control and 81.5

m³/ha in the mulched variant. These findings indicate that plastic-mulch sowing technology reduces water consumption by approximately 35% [7–13].

R. Qurbonov (2001) reported improved soil properties in fields where cotton was cultivated under plastic mulch, especially when the ridges were fully covered with film. Mulching significantly reduced evaporation from the soil surface, resulting in a higher water-use efficiency of the crop.

Experiments conducted by N. M. Ibragimov, L. A. Mirzayev, and D. U. G‘ofurov (2009) revealed that when nitrogen fertilizer was applied at a rate of 200 kg/ha, placing 50% of the annual rate 10–12 cm away from the seed row at a depth of 15 cm during sowing did not adversely affect germination and ensured optimal plant development and increased yield [14].

According to recommendations developed by PSUYAITI scientists (2017), three factors must be considered when determining plant density for cotton sown under plastic mulch: varietal biological characteristics, soil fertility, and climatic conditions. In highly fertile soils, 90–100 thousand plants per hectare are recommended for varieties S-6524, Andijan-35, Andijan-36, and Sulton. In moderately fertile soils, the recommended density is 100–110 thousand plants per hectare, while in low-fertility soils, 110–120 thousand plants per hectare are advised. For Andijan-36 and Andijan-35, a density of 120–130 thousand plants per hectare provides the best results.

At the “Fergana Ocean Textile” cotton–textile cluster in Fergana district, seed sowing operations are being implemented using Turkish technology.

In conclusion, the new method of cotton cultivation offers numerous advantages. It significantly reduces irrigation water consumption and production costs while increasing productivity. Special drip-irrigation tubes are placed beneath the mulch, and seeds are sown in paired rows in hill-drop fashion, ensuring uniform stand establishment. No thinning or hoeing is required. The irrigation tubes maintain optimal soil moisture at appropriate depth and radius and also enable precise application of water, mineral fertilizers, pesticides, and herbicides. As a result, even in water-deficient and low-fertility soils, high yields can be achieved [9].

Another important advantage of this system is the twofold reduction in seed requirements. Despite using fewer seeds, germination rates are high, and approximately 200,000 healthy plants per hectare can be established and maintained. This contributes to earlier maturity, increased efficiency, and improved fiber quality.

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