# PROSPECTS FOR GROWING TOMATO SEEDLINGS ON THE BASIS OF RESOURCE-SAVING TECHNOLOGIES

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**Abstract:**This article presents the results of scientific research on the technology of growing tomatoes based on the invention of the "method of growing plants" invented by scientists from the Andijan Machine-Building Institute. This technology is based on the recycling of cotton ginning waste, the cultivation of various seedlings of plants on their basis and the increase in soil fertility due to these wastes.
**Keywords:**pores, cotton waste, soil technology, resource saving, raw cotton, cellulose, fractional composition, biohumus, bioglass

**Introdution.** In the following years, intensive seasonal rotation of crops in the cultivation of agricultural products, local porous materials((wood shavings, rice husks, hemp fiber, cotton waste, sand) to increase soil fertility, increase work productivity and reduce labor costs, small-scale soil vegetable cultivation, which provides production even on degraded land, has been implemented on a large scale. not increased.(1)

**Experimental methods and preparations in literature.**

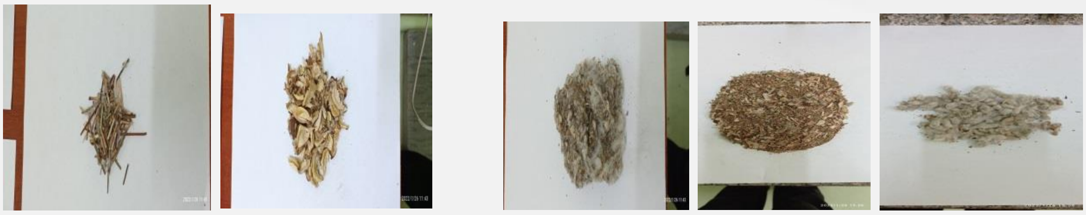
One of such resource-saving technologies - seedling growing method was discovered by the scientists of the Andijan Institute of Mechanical Engineering, and scientific research is currently being conducted on the cultivation of various plant seedlings using this technology. The basis of this technology is the disposal of cotton gin waste, the cultivation of various plant seedlings on the basis of this waste, and the increase of the productivity of cultivated fields. The composition of this waste is mainly wood, cotton husks, loose seeds, organic dust and leaf flakes, and partially cotton fibers, 98 percent cellulose. It is known that

Determination of the fractional composition of the waste brought from the cotton ginning plant was carried out under laboratory conditions.

In picture 1

a) cyclone waste - "bur" b) seed fluff.

200 grams of waste was taken analytically in laboratory conditions, and with the help of tweezers, 1-woods, 2-bags, 3-cotton fibers, 4-organic dust and cotton leaves and 5-cotton seeds were separated from it.



1 2 3 4 5

As a result of repeated separation and weighing, the amount of waste components was determined.

The results of the experiment on determining the fractional composition of cyclone waste - "Bur":

**Tab №1**

| **Number of experiments** | **Properties, grams** | **Pelvic floor, gram** | **Cotton fiber, gram** | **Organic dust and cotton leaves, grams** | **Cotton seed, gram** |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |
| 1. | 12.30 | 61.70 | 70.95 | 42.35 | 13.20 |
| 2. | 9.65 | 46.75 | 89.95 | 42.85 | 11.00 |
| 3. | 9.10 | 57.25 | 77.65 | 41.75 | 14.40 |
| 4. | 10.95 | 55.40 | 82.40 | 37.85 | 13.40 |
| 5. | 11.10 | 49.00 | 86.50 | 42.40 | 11.05 |
| **Amount** | **55.1** | **273.1** | **411.45** | **212.2** | **69.05** |
| **Average value** | **11.02** | **54.62** | **82.29** | **42.44** | **13.81** |

These wastes were processed on the basis of special technology, and glasses were prepared using a screw press. The cup pits were filled with biohumus and prepared for planting seedlings and seedlings.

3,4 mln. tons of raw cotton is grown, the amount of waste generated during its processing is approximately 150,000 tons. These wastes are required to be properly disposed of according to the Law of the Republic of Uzbekistan "On Waste".

In order to determine the effectiveness of these wastes and biohumus in the cultivation of various crops, experiments were conducted on various plants in the laboratory and field areas. In particular, the results of experiments with tomato plants confirmed the positive aspects of this method.

Experiments began this year in the winter season, that is, in February. For this, flower pots made of plastic material, various wastes of the cotton ginning plant, biohumus, cups specially made from paper and waste, radishes heated at 80°C, seeds of tomato variety "Lima" and analytical scales were used.

The following experiments were conducted to grow tomato seedlings:

Two long-shaped flower pots were taken, and in the first flower pot "Experiment" was placed cyclone waste, seed fluff thoroughly diluted in water, and on top of it, a mixture of radish heated in an electric oven and biohumus was placed, and in the second flower pot "Control" was placed radish from the land area of the institute. , the same amount of tomato seeds were planted on February 19, 2022. When the seeds germinated and it was time for planting, that is, on March 10, 2022, the waste was placed in paper cups and pressed, and the pit was filled with biohumus, and tomato seedlings were planted in it. And for the "control", simple radish was put in such cups and cooked. In a similar experiment, several tomato seedlings were planted in a larger container made of polystyrene. Seedlings were grown in a laboratory room at a temperature of 20-25 degrees Celsius.

Photo 1 - biohumus on heated radish and scales.

Photo 2 - Cyclone waste and seed fluff placed in the flower pot before planting.

Photo 3 – tomato seeds sown on substrates in flower pots.

Photo 4 - sprouted tomato seedlings.

Photo 5 - tomato seedlings planted in waste cups.

Photo 6 - tomato seedlings grown in waste cups.

Photo 7 - tomato seedlings grown in a compost pile on cyclone waste.

Photo 8 - tomato seedlings prepared for planting in the open field

Photo 9- tomato seedlings planted and cared for in the open field "Experiment".

Photo 10 - tomato seedlings planted and cared for in the open field "Control".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Seedlings planted in both variants developed in the same way in the open field, only the experimental seedlings were slightly different in color, they differed from the "Control" in their dark greenness and body thickness, and the processes of pruning, flowering, and ripening of tomatoes were also the same. For control, seedlings were selected from five plants in both options and the following dimensions of seedlings were obtained on June 8, 2022.

**Tab №2**

| Experiment **No** | **The length of the main stem, cm** | **Diameter of the main stem, mm** | **Number of flowers, pcs** | **Number of Shona, piece** | **Number of fruits born, pcs** |
|---|---|---|---|---|---|
| **Experiment** | | | | | |
| 1. | 60 | 10 | 7 | 17 | 3 |
| 2. | 60 | 10 | 4 | 15 | 5 |
| 3. | 60 | 10 | 4 | 13 | 6 |
| 4. | 62 | 12 | 4 | 10 | 4 |
| 5. | 64 | 10 | 8 | 10 | 5 |
| **Average indicator** | **61.2** | **10.4** | **5.4** | **13** | **4.6** |

**Tab №3**

| Experiment **No** | **The length of the main stem, cm** | **Thickness of the main stem, mm** | **Number of flowers, pcs** | **Number of Shona, piece** | **Number of fruits born, pcs** |
|---|---|---|---|---|---|
| **Control** | | | | | |
| 1. | 65 | 8 | 2 | 14 | 5 |
| 2. | 50 | 8 | 0 | 12 | 7 |
| 3. | 65 | 10 | 4 | 11 | 7 |
| 4. | 60 | 8 | 3 | 11 | 8 |
| 5. | 65 | 8 | 2 | 20 | 9 |
| **Average indicator** | **61** | **8.4** | **2.2** | **13.6** | **7.2** |

As can be seen from the results of the experiments, the final performance of both options was almost the same. However, at the beginning of August, the tomato seedlings were infected with the "Whitefly" disease. As a result, all the tomato seedlings in "Control" withered. However, seedlings in "Experiment" did not get this disease until September. In another case, the land was enriched with organic fertilizers due to the waste placed on the land along with the seedlings.

Tomato seedlings planted in the experimental area on July 13, 2022 approved, the following results were obtained and included in Tab №4.

**Tab №4**

| Experiment **No** | **Number of ripe tomatoes, pcs** | **Number of unripe tomatoes, pcs** | **Number of ripe tomatoes, pcs** | **Total number of tomatoes, pcs** | **Weight of ripe tomatoes, grams** |
|---|---|---|---|---|---|
| Experiment | | | | | |
| 1. | 9 | 19 | 0 | 28 | 0 |
| 2. | 10 | 10 | 1 | 21 | 51 |
| 3. | 7 | 8 | 0 | 15 | 0 |
| 4. | 4 | 11 | 5 | 20 | 185 |
| 5. | 2 | 0 | 2 | 4 | 177 |
| **Total** | **32** | **48** | **8** | **88** | **413** |
| **Average indicator** | **6.4** | **9.6** | **1.6** | **17.6** | **51,625** |

Tab №5

| Experiment **No** | **Number of ripe tomatoes, pcs** | **Number of unripe tomatoes, pcs** | **Number of ripe tomatoes, pcs** | **Whole tomatoes number, pcs** | **Weight of ripe tomatoes, grams** |
|---|---|---|---|---|---|
| **Control** | | | | | |
| 1. | 1 | 1 | 10 | 12 | 455 |
| 2. | 6 | 7 | 5 | 18 | 243 |
| 3. | 2 | 8 | 9 | 19 | 393 |
| 4. | 1 | 10 | 3 | 14 | 144 |
| 5. | 2 | 7 | 9 | 18 | 377 |
| **Total** | **12** | **33** | **36** | **81** | **1612** |
| **Average indicator** | **2.4** | **6.6** | **7.2** | **16.2** | **44.77** |

Photo -11. Grown tomato crop. Photo -12. Controlled tomato seedlings

For "Experiment" and "Control" using the information given in tables №4 and №5 Tomato yield per hectare was determined. If 55,600 tomato seedlings were planted on one hectare of land, the yield was 50.52 tn/ha for tomatoes in "Experiment" and 40.33tn/ha for tomatoes in "Control" using the figures determined for 5 tomato plants.

To calculate the average weight of the cyclone waste glasses after drying, 25 glasses were weighed on an analytical balance. Weighing results are presented in tab №. 6. The weight of the total weighed cups and the average weight of the cups were determined.

**Tab №6**

| **Number of pulls** | **Glass weight, grams** |
|---|---|
| 1. | 107.58 |
| 2. | 128.20 |
| 3. | 135.20 |
| 4. | 111,12 |
| 5. | 104.32 |
| 6. | 103.22 |
| 7. | 134.50 |
| 8. | 115.60 |
| 9. | 106.59 |
| 10. | 99.77 |
| 11. | 104.22 |
| 12. | 99.80 |
| 13. | 120.15 |
| 14. | 128.44 |
| 15. | 132.20 |
| 16. | 134.60 |
| 17. | 105.40 |
| 18. | 102.25 |
| 19. | 133.45 |
| 20. | 125.26 |
| 21. | 102.10 |
| 22. | 104.50 |
| 23. | 101.90 |
| 24. | 125.60 |
| 25. | 132.20 |
| Total weight of glasses | 2898.17 |
| The average weight of the glass | 115.93 |

Using the figures in this table and the conversion of cyclone waste into nutrients during the growing season (Agrochemical analysis), it was determined how much organic matter, phosphorus and potassium were added to the land. For this, the soil taken from the land area of the institute for laboratory experiments, the soil taken from the land area where field experiments were conducted, and the soil formed as a result of the decomposition of cyclone waste in flower beds used for conducting experiments were analyzed in a special laboratory. The results of the analysis are given in table №7.

Tab №7.

| No | Area, (ha) | Plow layer (cm) | Analysis results | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | humus content mg/kg | | Potassium | | Phosphorus | |
| | | | % | group | exchanger mg/kg | group | active mg/kg | group |
| 1 | 1st place " Experiment " | 0-30 | 1,500 | high | 384 | 4 | 68 | High |
| 2 | | 30-50 | 1,550 | | | | | |
| 3 | 2nd place "planted area" | 0-30 | 1,850 | Very high | 388 | 4 | 72 | High |
| 4 | | 30-50 | 1,900 | | | | | |
| 5 | 3nd place "Seedlings are grown land area" | 0-30 | 2,250 | Very high | 396 | 4 | 78 | High |
| 6 | | 30-50 | 2,255 | | | | | |

**Application:**

| Amount of compost | Mobile Phosphorus | Exchangeable potassium | The degree of salinity is chlorine ion |
|---|---|---|---|
| 1 gr is very low up to 0-0.40<br>-2 g less to 0.41-0.80<br>-3 gr is on average 0.81-1.20<br>-4 gr is enough to 1.21-1.60<br>-5 gr up to 1.61-2.0<br>-6 gr is very high from 2.0 | -1 gr very little to 0-15<br>-2 g less until 16-30<br>-3 gr on average up to 30-40<br>- 4 gr is enough up to 46-60<br>-5 gr above 60 | -1 gr very low to 0-100<br>-2 g less to 101-200<br>-3 gr on average 201-300<br>-4 gr is enough up to 301-400<br>-5 gr above 400 | -1 unsalted 0-0.01<br>-2 weakly saline 0.01-0.04<br>-3 average salinity 0.04-0.1<br>-4 strongly salted 0.1<br>-0.2 -5salt 0.2-0.3< |

Using the information in tables №6 and №7 above, the amount of humus, potassium, and nitrogen was calculated for the decomposition of organic waste in bio cups.

In particular, when tomato seedlings are planted in biocups in a 0.3x0.6 scheme, on average, 55,600 seedlings are needed. The average weight of the cups is 115 grams, 5% of it is biohumus, 10% is heated radish and 75% waste, and the amount of waste in a bio cup is 86 grams.

Hummus calculation: 55600 sticks x 86gr = 4781600gr = 4781.6kg
4781.6kg x 1.5mg/kg = 7172.4mg = 7.17g/ha.
Potassium ratio: 4781.6kg x 384mg/kg = 1836134.4mg = 1836.13g/ha.

Nitrogen ratio: 4781.6kg x 68mg/kg = 325148.8mg = 325.15g/ha.Also, 5% biohumus in the biocup is 5.75g x 55600 bush = 319700g = 319.7kg.

The total amount of organic substances introduced into the land through biocups is 321168.45gr/ha =321.17kg/ha.

Heating the soil during the production of bioglass ensures that it is free from various diseases and bacteria that may be present in it, there is no need to cultivate seedlings, use mineral fertilizers and pesticides during the growing season. As a result of the introduction of this technology, the problem of utilization of "bur", which is considered as industrial waste, will be solved positively,also, as a result of the use of waste in the cultivation of seedlings, organic matter is added to the land, therefore, mineral fertilizers and energy resources are saved, and due to this, economic efficiency is achieved.

A special laboratory stand - a screw press bench was prepared for the production of glasses. At this workshop, glasses were made from industrial waste brought from "Kurganteks" LLC based on special technology and used for planting seedlings. Below are photos of the cup forming press and the cups made in it.

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Photo 13. General view of the workshop for making glasses from waste,

Photo 14. Cups made of waste for planting seedlings

The question arises, why is it necessary to grow seedlings in glasses? This is why organic waste generated in cotton ginning plants should be usefully disposed of first. Second, the polyethylene films that are currently used for the purposes of growing seedlings will be abandoned, pollution of the environment with polyethylene waste will be prevented, and urgent ecological issues will be solved. Fourthly, as a result of the cultivation of natural and ecologically clean products, the possibility of exporting products will increase.

It is known that in hydroponics and other technologies, which are widely used in small technologies abroad, i.e. in heated "greenhouses", coconut substrate, peat, moss, conifer bark, as well as mineral perlite, expanded clay, vermiculite, mineral cotton, etc. are used as innovative solutions. Due to the scarcity of the above substrates in Uzbekistan, these products are imported from abroad and a large amount of foreign currency is spent. Therefore, most of them are not widely used due to their high cost.

Large-scale production and use of waste cups in farms will allow the cultivation of ecologically pure vegetable crops, eliminating the use of chemicals currently used in their cultivation. In the areas of land freed from wheat, it becomes possible to grow valuable crops as a repeat crop.

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