

# The Effects of Types of Sowing and Plant Thickness to Growth, Development and Harvest of Cotton Plant

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**Abstract:** *According to the result of the 3-year research, it was proven that the productivity of cotton cultivar 'Andijan-37', which was double-line planted 115,5 and 145,0 per ha and fed with mineral fertilizer under the norm of  $-N_{200}P_{140}K_{100}$  kg/ha, consist of 38,2 and 40,8 c/ha. And we got more product of 4,7 and 6,5 c/ha than the observation type planted on flat land. In other words, it is confirmed that it is the most productive way to double-line plant of the cotton cultivar 'And-37' 115,5 and 145,0 thousand cotton plant per ha.*

**Keywords:** cotton, productive, cultivar 'Andijan-37'

## 1. Introduction

Transferring to the market economy has caused for a number of economic issues in agriculture.

In the current time these problems, which are in utilizing new economic matters and reaching types of ownership, in the agriculture of our country especially, cotton growing are being solved.

In cotton growing, market economy requires to produce products that are early-ripening, top quality and highly competitive in the world market.

Nowadays the abovementioned problems are in existence in the field of cotton growing in Andijan region in the Republic of Uzbekistan, and it is main task to create and utilize new resource thrifty agro technologies that are highly competitive in the world market and to get abundant high quality harvest from cotton by using efficiently water, land and the natural resources.

To solve these issues, the new cotton cultivar 'Andijan-37' which is created and adopted to the climate conditions of Andijan, gives the solution to the issues how to get high quality and durable for plant diseases and pests, persevering cotton.

That's why it is important to produce perfect agro technology by researching scientifically all aspects of care techniques of the cotton type.

In order to solve current problems, in 2009-2011 the experiment field in the Andijan Experimental Station of RICBSP&CA was carried out in order to experiment the effects of the norms of fertilization and different plant thickness of planting new 'Andijan-37' double-lined and single-lined to the growth, development and cotton harvest.

## 2. Materials and Methods

The experiment field has been watered for many years consisting of light fallow soil and the mechanic ingredient of soil is normal sandy, and the subsoil water is situated 4-5 min depth from land surface and the amount of humus in tilled layer of soil is 0,9-1,0%. The alkaliness of soil melt is  $pH-0.7$  ha.

The variants are double folded, situating in one tier, and general area of each piece is  $200\text{ m}^3$  and accountable area is  $100\text{ m}^3$ .

Before beginning field experiment, soil samples were taken from 0-30 and 30-50 cm soil lines, and the general humus amount was determined by Tyurin method, nitrogen, phosphorus and potassium by I.Maltsev's method and L.Gritsenko's method and changeable potassium by Protasov's method.

Moreover, the moisture capacity of soil in 0-100 lines and volume weight of soil at the beginning and end of sprout period, water conductivity and hollow character were clarified.

The characters of physic and water conductivity of soil was clarified by method of ex-period Cotton Growing Research Institute 'Methods of agrochemical, agrophysical and microbiological research in cotton growing field regions' (1963).

All analysis and accounting were carried out according to 'The methods of field experiments' (2007) accepted in UzRICG. The experiment information was mathematically analyzed by method of 'Field experiment methods' by B.A.Dospekhov (1985).

In the experiment the cotton cultivar 'Andijan-37' was planted double lined and single lined on the land prepared in autumn. According to the cotton experiment system, mineral fertilizers were fertilized in two norms  $N_{150}P_{105}K_{75}$  and  $N_{200}P_{140}K_{100}$  kg/ha (table 1).

**Table 1:** The time of fertilizing, kg/ha

| Annual norms of fertilizers |                               |                  | Before hollowing              |                  | In the 2-4 sympodium period |                               | In the period of putting forth buds |                               |                  | In the period of blossom |                               |                  |
|-----------------------------|-------------------------------|------------------|-------------------------------|------------------|-----------------------------|-------------------------------|-------------------------------------|-------------------------------|------------------|--------------------------|-------------------------------|------------------|
| N-NO <sub>2</sub>           | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | N-NO <sub>2</sub>           | P <sub>2</sub> O <sub>5</sub> | N-NO <sub>2</sub>                   | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | N-NO <sub>2</sub>        | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O |
| 150                         | 105                           | 75               | 65                            | 40               | 10                          | 10                            | 70                                  | 15                            | 10               | 70                       | 15                            | 25               |
| 200                         | 140                           | 100              | 80                            | 50               | 30                          | 15                            | 70                                  | 20                            | 30               | 100                      | 25                            | 20               |

### 3. Results

In irrigating agriculture, like other plants, the growth and development of cotton depend on planting style, plant thickness in each ha and the degree of natural factors like water, moisture, temperature, brightness, air and soil factors and fertilizers being provided with.

Taking into consideration aforesaid factors, we can say that the style of planting cotton seed and plant thickness affect differently to the growth and development of cotton cultivar 'Andijan-37'.

The difference in planting young cotton in lines plays a great role in the growth and development of cotton no matter how the difference between in the number of thickness of young cotton plants in experiment variants is so little.

The first observation during the experiment shows that the cotton which are planted in the variant of planting cotton seed on smooth land in a simple way grow weakly and slowly. Because of that the soil temperature in pieces of this type of land is lower than in other types, cotton seeds grows slowly.

In short, the cotton seed which are planted double lined and single lined grow and develop 3-4 days earlier than that of on smooth land sowed in a simple way due to highly utilization of soil and life factors.

According to the observation on August 1 on growth, development and harvest, the cotton which sowed single lined in the thickness of 83,2 and 113,8 thousand per ha and fertilizing NPK-200-140-100 kg/ha grew well and fast. And the height of main stem equaled to 92,2 and 91,2 cm. That cotton grew 5,9 and 4,9 cm higher than that of being fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha. Harvest elements and branches were more than 13,4 and 13,6 and 17,1 and 17,5.

As for the cotton sowed double-lined, it is essential to say that these variant plants grew shorter with 4,8-5,7 cm main stem than single lined sowed cotton respecting to the norm of fertilizing and plant thickness.

The difference between in the growth and development of cotton was seen in the form of harvest branches and elements. The decline of these indicators occurred in both type of cotton sowing at the same time with the increase of the amount of plants. For instance, it consisted of low harvest from the variants of cotton which had been sowed single lined 136,5 and 137,7 thousands of plants per ha and cotton which had been double line sowed 144,7 and 145,0 thousand per ha. For example, the harvest branches were 10,5 and 10,4, and the harvest elements were 10,8 and 11,7 with 3,7 and 3,9 cotton bolls in single lined sowed cotton, and for double lined sowed cotton the indicators were 11,8 and 11,2;

14,0 and 14,2; 5,5 and 4,5 respectively. In both types the harvest was low.

Because the thicker the number of plants on particular land, the less temperature, air, moisture of soil, brightness they are provided.

According to the observed information on August 1, it was observed that the number of cotton bolls in the cotton which had been sowed in both style in autumn increased significantly thanks to efficient usage of mineral fertilizers, N<sub>200</sub>P<sub>140</sub>K<sub>100</sub> kg/ha, and other factors, and sparse plants in the variants of 12-13 with 84,4 and 115,5 thousand plants per ha, and in the variants of 5-6 with 83,2 and 113,7 thousand plants per ha. In this type the cotton bolls multiplied from 3,4-3,9 to 10,9-10,6 and from 2,3-2,6 to 10,7-11,0.

To ascertain the weight of cotton in cotton bolls is considered one of the important indicator of cotton harvest. According to the experiment results, the cotton harvest in the cotton variants of 4,7, 11 and 17 which thickly sowed in both styles weighed 3,7-3,9 kg. Because this variant plants affected significantly the harvest and form of young plants under the influence of plant thickness. As a result, short plants with smaller cotton bolls grew. It was not observed the serious or big difference between the weight of cotton bolls of belonging to the variants (2-3, 5-6, 9-10, 12-13) whose seeds had been sowed in both types, young plants had been rarefied and the mineral fertilizers had been provided in both styles. However, it is seen for both types of seed sowing more bigger cotton bolls in the variants of cotton fertilized N<sub>200</sub>P<sub>140</sub>K<sub>100</sub> kg/ha than in the variants of cotton fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha. For example, the weight of cotton of the cotton bolls formed 5,6 and 5,4 g for the variants of whose seeds had been sowed double lined 85,5 and 115,5 thousand per ha, fertilized N<sub>200</sub>P<sub>140</sub>K<sub>100</sub> kg/ha. We can say that, the weight of cotton of the cotton bolls is 0,2 and 0,5g heavier than that of the cotton sort fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha and respectively, 0,4-0,5 g heavier than that of the single lined sowed cotton fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha (for the variants of 5-6 and 13-14).

It is obvious that the final results of agro measures which were experimented find its reflection in abundant cotton harvest. For instance, the cotton harvest was average 35,7 and 37,7 c/ha for the variants of fertilized N<sub>200</sub>P<sub>140</sub>K<sub>100</sub> kg/ha and single line sowed with 83,2 and 113,7 thousand plants. It means that 2,1 and 3,2 c extra harvest was produced.

Furthermore, 4,4 and 4,1 c extra harvest was produced for the variants of 2- 3 which was fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha. As for the variant 7 whose young cotton plants had been thickened with 137,7 thousand plants, the decline in productivity was observed with 29,1 c/ha. It was ascertained for this variant that productivity was decreased 4-5 c comparing with the supervised variation smooth land (table 2).

**Table 2:** The effects of sowing types, plant thickness and fertilizers to the growth and development of cotton

| Variant No. | Hoeing type | Sowing style | Plant thickness thousand per ha | Annual norm of fertilizer, kg/ha |                               |                  | August 1             |                        | Cotton bolls, 01.09 | Cotton weight of per boll | Cotton harvest average 3 years, c/ha |
|-------------|-------------|--------------|---------------------------------|----------------------------------|-------------------------------|------------------|----------------------|------------------------|---------------------|---------------------------|--------------------------------------|
|             |             |              |                                 | N-NO <sub>3</sub>                | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | main stem height, cm | number of cotton bolls |                     |                           |                                      |
| 1           | 2           | 3            | 4                               | 5                                | 6                             | 7                | 8                    | 9                      | 10                  | 11                        | 12                                   |
| 1.          | Smooth land | Single lined | 96,5                            | 200                              | 140                           | 100              | 86,3                 | 6,4                    | 10,2                | 5,2                       | 33,6                                 |
| 2.          | Furrow      | Single lined | 83,3                            | 150                              | 105                           | 75               | 86,4                 | 5,1                    | 9,8                 | 5,0                       | 31,3                                 |
| 3.          | Furrow      | Single lined | 114,9                           | 150                              | 105                           | 75               | 87,0                 | 5,6                    | 10,2                | 4,9                       | 32,6                                 |
| 4.          | Furrow      | Single lined | 136,3                           | 150                              | 105                           | 75               | 77,0                 | 3,7                    | 7,0                 | 3,7                       | 28,5                                 |
| 5.          | Furrow      | Single lined | 83                              | 200                              | 140                           | 100              | 92,2                 | 7,1                    | 10,9                | 5,5                       | 35,7                                 |
| 6.          | Furrow      | Single lined | 113,7                           | 200                              | 140                           | 100              | 91,2                 | 7,2                    | 10,6                | 5,3                       | 36,7                                 |
| 7.          | Furrow      | Single lined | 137,7                           | 200                              | 140                           | 100              | 77,3                 | 3,9                    | 7,0                 | 4,2                       | 29,1                                 |
| 8.          | Smooth land | Double lined | 97,7                            | 200                              | 140                           | 100              | 86,1                 | 5,9                    | 9,9                 | 5,2                       | 34,1                                 |
| 9.          | Furrow      | Double lined | 83,9                            | 150                              | 105                           | 75               | 86,2                 | 5,6                    | 9,3                 | 5,1                       | 30,8                                 |
| 10.         | Furrow      | Double lined | 114,7                           | 150                              | 105                           | 75               | 84,1                 | 5,5                    | 10,2                | 5,2                       | 33,5                                 |
| 11.         | Furrow      | Double lined | 144,6                           | 150                              | 105                           | 75               | 77,6                 | 4,5                    | 8,0                 | 3,7                       | 34,3                                 |
| 12.         | Furrow      | Double lined | 85,4                            | 200                              | 140                           | 100              | 87,4                 | 6,3                    | 10,7                | 5,6                       | 34,0                                 |
| 13.         | Furrow      | Double lined | 115,5                           | 200                              | 140                           | 100              | 85,3                 | 5,7                    | 11,0                | 5,4                       | 38,2                                 |
| 14.         | Furrow      | Double lined | 145,0                           | 200                              | 140                           | 100              | 82,6                 | 4,5                    | 8,1                 | 3,9                       | 40,8                                 |

Extra harvest could not be produced in all the variants single line sowed and fertilized N<sub>150</sub>P<sub>105</sub>K<sub>75</sub> kg/ha.

We can see the highest productivity in the variants whose seeds were sowed double line and fertilized NPK-200-140-100 kg/ha.

#### 4. Conclusions

- 1) Taking into consideration the conditions of light fallow land in Andijan region, it was recommended to sow double lined the cotton cultivar 'Andijan-37' on land prepared in autumn, and the agro technology of planting 144-145 thousand plants fertilized NPK-200-140-100 kg/ha.
- 2) The cotton productivity for cultivar 'Andijan-37' using this agro technology will increased 40-42 c/ha. It is possible to grow 7-8 c extra harvest comparing with the current agro technology. The degree of profitability will grow 27-29%.

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