

Tillage Agrotechnologies and Influence of Repeated Crops on Cotton Yield

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Abstract: *In conditions of light brown soil of Andijan province, so that to get high and qualitative yield from cotton the land was cultivated in different periods and depth and such crops as maize, mungbean and soybean were sowed after the winter wheat. We achieved gaining high yield of cotton by ploughing the land in 32-35 cm and making rows in autumn; cultivating the land in 20-25 cm and sowing and soybeans as repeated crops in summer.*

Keywords: light brown soil, repeated crops, maize, mungbean, soybean, cotton, tillage

1. Introduction

Nowadays, the territory of the land where cotton is planted composes 29,2 millions of hectares, every year 22,8 millions of tons of cotton are cultivated. Recommendations and manuals worked out on the basis of the results of the scientific research works of the influence of growing repeated and interval crops grown by different methods after cultivation profuse and qualitative yield of cotton and wheat; the remains of different crops sown after cotton and wheat on agrophysical, agrochemical and water-physic features of the soil in the systems of short period and exchange planting in crop rotation in cotton complex of the republic has been very important in gaining profuse and qualitative yield from cotton and wheat.

But, tillage agrotechnologies and the influence of repeated crops on cotton yield in conditions of light brown soils of Andijan province have not been studied yet.

Resulting in these problems, in order to study the methods of tillage and the influence of repeated crops to cotton, a number of scientific works were carried out.

2. Methods and Materials

Scientific works were carried out in the period of 2007-2010 in the fields of Experimental Station of Research Institute of Cotton Breeding, Seed Production and Cultivation Agrotechnologies located in Asaka region of Andijan province.

The experimental field was light brown colored soil, with minute pats, mechanic content, irrigated for a long time and not salty. Stored waters are in 4-5 m from the level of land.

The experiment was carried out in 12 variants, 4 repetitions and in a row, the total surface of each piece of land was $0,9 \times 8,0 = 7,2 \text{ m} \times 50 = 60 \text{ m}^2$ and their calculation is 180 m^2 . The total surface of the experiment was $360 \times 4 = 1440 \text{ m}^2 \times 12 = 1,7$ hectares.

The surface of the experiment after the winter wheat due to the amount of remnants of the wheat and root remains and

the system of the experiment was cultivated up to 32-35 cm depth in the 1st and 2nd variants and in the 2nd variant the rows were taken. And in the 3rd and 4th variants the lands were left for rest, they were cultivated in 32-35 cm depth (*in autumn*), in the 4th variants rows were taken. In the 5th-8th variants the land was cultivated in 20-25 cm/ha (*in summer*). The 5th variant was left as a control variant without sowing anything. In the 6th and 8th variants maize, mungbean and soybean were sowed as repeated crops. In the 9th and 12th variants the land was chiseled in 15-18 cm. Here, nothing was sowed in the 9th variant (*i.e. in the control variant*). In the 10th and 12th variants maize, mungbean and soybean were sowed as repeated crops.

In spring the experiment was continued, «Andijan-35» cotton cultivar was sown in the rows prepared in autumn as in 90 x 12-1 sowing scheme on the plain land. Mineral fertilizers were used as $N_{200}P_{140}K_{100}$ kg/ha for cotton.

The following agro technical measures and calculations in the experiment were carried out due to the manual «Methods of carrying field experiments» by Uzbek Research Institute of Cotton Production (2007).

3. Research Results

At the beginning of the research, water physical features, particularly the mechanic content, aggregate content, volume weight, soil porosity and water resistance were determined as primary data.

A part of the land freed from winter wheat was reclaimed by different ways and repeated crops were sown, then the land was cultivated in 32-35 cm depth and rows were taken, in spring cotton seeds were sown in these rows.

So, in the research the 5th and 9th variants were left until they were reclaimed in summer and were received for control.

We know that, all cotton varieties in conditions of different soil and climate conditions definite agro technical measures. Methods of soil reclamation and the influence of repeated

crops on the appearance of cotton seeds and plant thickness were noticed much.

Here, due to the data taken by the results of three years experiment, methods and dates of soil reclamation after the winter wheat; the influence of repeated crops on the number of plants that were sown between the rows of cotton were seen clearly.

For instance, plugging the land in 32-35 cm depth in reclamation of the land after the winter wheat, cultivating it in 20-25 cm depth and in methods of chiseling in variants where the land was left till autumn, under the influence of inconvenient agro physic atmosphere, the plant thickness decreased relatively to 6-7 tho/ha (table 1).

Table 1: Methods, dates and influence of repeated crops on the thickness of cotton, tho/ha (average for 3 years)

| Variant | Soil reclamation | | Repeated crops | Curves of rows | | | Average |
|---------|----------------------------|--------|----------------|----------------|------|------|---------|
| | methods | dates | | I | II | III | |
| 1 | Main plugging | Summer | - | 76,3 | 80,5 | 81,7 | 79,5 |
| 2 | Main plugging, making beds | Summer | - | 82,4 | 79,2 | 82,6 | 81,4 |
| 3 | Main plugging | Autumn | - | 87,9 | 83,1 | 89,4 | 86,8 |
| 4 | Main plugging, making beds | Autumn | - | 86,5 | 82,6 | 87,7 | 85,6 |
| 5 | Cultivating | Summer | - | 82,4 | 77,7 | 80,2 | 80,1 |
| 6 | Cultivating | Summer | Maize | 87,3 | 86,8 | 82,4 | 85,5 |
| 7 | Cultivating | Summer | Mungbean | 86,4 | 80,1 | 84,6 | 83,7 |
| 8 | Cultivating | Summer | Soybean | 81,2 | 85,7 | 86,9 | 84,6 |
| 9 | Chiseling | Summer | - | 79,6 | 76,2 | 78,5 | 78,1 |
| 10 | Chiseling | Summer | Maize | 81,1 | 85,7 | 86,4 | 84,4 |
| 11 | Chiseling | Summer | Mungbean | 86,0 | 80,5 | 84,6 | 83,7 |
| 12 | Chiseling | Summer | Soybean | 87,9 | 83,8 | 87,8 | 86,5 |

As a result, in these variants average plant thickness composed 79,5 tho/ha, 81,4 tho/ha, 80,1 tho/ha and 78,1 tho/ha, accordantly. The best optimal plant thickness was 86,8 tho/ha and 85,6 tho/ha after winter wheat 4th variants of the cotton was observed in the 3rd and 4th variants in methods of summer reclamation of the soil in 32-35 cm in summer and making beds. So, in the method of the reclamation of the soil in 20-25 cm after winter wheat, repeated maize, mungbean and soybean, the plant thickness in the 6-7-8 variants composed 85,5 tho/ha, 83,7 tho/ha, 84,6 tho/ha.

We can say that, due to the repetitions in the experiment and among the variants, plant thickness differed to 5-7 tho/ha during 3 years. Besides that, these differs did not influence on the cotton yield. This confirms that the experiment was carried out correctly.

The same orders and laws were observed in cotton ripening of and cotton yield. Under the influence of methods of soil reclamation and repeated crops the cotton yield ripened in different periods.

As the influence of methods of summer reclamation of soil on the repeated crops (*maize, mungbean, soybean*); influence of methods of soil reclamation and repeated crops on the cotton yield were studied, we observed that the portion of cotton yield changed depending on the above mentioned agro technical measures. So, when the soil was plugged in 32-35 cm depth in summer after the winter wheat (2007-2009), the following year in the 1st variant the cotton yield composed 31,2; 32,1 and 30,8 c/ha due to the years of experiment (table 2).

Table 2: Methods of soil reclamation, their dates and the influence of repeated crops on the cotton yield

| Variants | Total yield, c/ha | | | | Additional yield from cultivation, c/ha | | |
|----------|-------------------|------|------|---------|---|-----------|----------------------|
| | 2008 | 2009 | 2010 | average | in summer | in autumn | after repeated crops |
| 1 | 31,2 | 32,1 | 30,8 | 31,4 | - | - | - |
| 2 | 31,7 | 32,8 | 30,7 | 31,7 | 0,3 | - | - |
| 3 | 33,6 | 34,3 | 33,6 | 33,8 | 2,4 | - | - |
| 4 | 34,8 | 35,4 | 34,2 | 34,8 | 3,4 | - | - |
| 5 | 30,3 | 31,4 | 31,0 | 30,9 | -0,5 | -2,9 | - |
| 6 | 33,5 | 32,8 | 32,8 | 33,0 | 1,6 | -0,8 | 2,1 |
| 7 | 35,2 | 35,5 | 34,0 | 34,9 | 3,5 | 1,1 | 4,0 |
| 8 | 36,1 | 35,7 | 34,8 | 35,5 | 4,1 | 1,7 | 4,6 |
| 9 | 29,6 | 29,1 | 30,8 | 29,8 | -1,6 | -4,0 | - |
| 10 | 32,4 | 32,0 | 32,0 | 32,1 | 0,7 | -1,7 | 2,3 |
| 11 | 33,0 | 33,2 | 32,2 | 32,8 | 1,4 | -1,0 | 3,0 |
| 12 | 32,8 | 33,9 | 32,6 | 33,1 | 1,7 | -0,7 | 3,3 |

We should admit that, among the years of experiment in 2009 the cotton yield was relatively high to 0,5-1,2 c/ha, it depends on climatic conditions. When the land was plugged in 32-35 cm depth in summer, the beds were made ready, the following year the yield indices composed 31,7; 32,8 and 30,7 c/ha, in the average 31,7 c/ha in the 2nd variant when cotton seeds were sown. That is we got 0,3 c/ha of additional yield from cotton due to the beds.

In the variant where the soil was plugged in 30-35 cm depth (3 variant), the above mentioned indices composed 33,6 c/ha; 34,3 c/ha; 33,6 c/ha and 33,8 c/ha, and we had the opportunity to get additional 2,4 c/ha yield than the 1st variant. So, we identified that there is a favorable date for soil reclamation. As a farmer, if we cultivate the land in summer after winter wheat, we can observe the decrease in cotton yield up to 2,4 c/ha. But if we make beds in autumn cultivation, additional cotton yield will increase to 1 c/ha and compose 34,8 c/ha. So, it was proved that, in summer cultivation, we can get additional 0,3 c/ha of cotton yield in summer cultivation,

in autumn 3,4 c/ha or 3,1 c/ha of additional yield from cotton.

We have informed before that, in autumn cultivation when the beds are made, such features as the aggregate content of water, water resistance, resistance, hollowness become favorable and the volume mass relatively.

We should confess that, nowadays in soil reclamation after winter wheat and in taking other agronomic measures one should work out such issues as questions of resource and water economizing.

Resulting in that in farms the land is cultivated in 20-25 cm depth in summer and repeated crops are sown.

In experiments the land was cultivated in 20-25 cm depth (5-8 variants) and repeated crops were sown. The 5th variant was left for controlling, here the cotton yield composed average 30,9 c/ha in 3 years. This index was observed to be 0,5 c/ha less than main cultivation (32-35 cm) and 2,9 c/ha less than autumn cultivation (3 variant).

When the soil is cultivated without putting inside out (20-25 cm) and the repeated crop maize was sown (6 variant) the cotton yield composed average 34,9 c/ha in 3 years. This means to have additional 1,6 c/ha. This index (33,0 c/ha) is 0,8 c/ha less than autumn cultivation, but the influence of a repeated crop- maize was 2,1 c/ha i.e. the remains of maize and its root remnants influenced the water-physical features of the soil well.

When mungbean was sown as a repeated crop by the same technology, in the 7th variant where the land was cultivated in 32-35 cm depth and the beds were made, the average cotton yield composed 34,0 c/ha and we were able to get additional 3,5 c/ha of cotton yield in summer reclamation (1 variant). This shows 1,1 c/ha high index from autumn cultivation and 4,0 c/ha higher yield because of a repeated crop.

We should clarify that, we were able to get not only 3,4 c/ha of additional yield of cotton when the soil cultivated in autumn (3 variant) but also 3,4 c/ha of additional yield from mungbean as well. And we should take into consideration that, we could have taken good yield from grain and hays, their remnants influenced all the features of the soil well.

When the soil were cultivated in 32-35 cm depth without putting inside out and soybean was sown as a repeated crop, we could have gained additional 4,1 c/ha of cotton. This index was higher to 1,7 c/ha than in autumn cultivation and 0,7 c/ha higher than in cultivating and making beds in autumn.

So, if don't sow repeated crops after winter wheat, we should cultivate these fields only in autumn or if it's possible even to make beds. Because, this method creates all the necessary favorable water-physical, agro chemical features for the soil.

In the variants where the soil was chiseled to 15-18 cm depth, we could gain less indices than in the methods of cultivating without putting inside out and autumn cultivation.

Only in the variants (11 and 12 variants) where such repeated crops as mungbean and soybean were sown, we could gain 1,4 and 1,7 c/ha of additional cotton yield, but this index was even less to -1,0 c/ha and -0,7 c/ha than autumn cultivation.

4. Conclusion

- 1) In order to get relatively higher yield from cotton after winter wheat in conditions of light brown soils of Andijan province one should cultivate the soil in 32-35 cm depth in autumn or cultivate the land in 20-25 cm depth subsurface tillage a sow such repeated crops as mungbean or soybean.
- 2) Maize doesn't increase the fertility of the land but only makes its features favorable.
- 3) It is more favorable to sow maize rather than leave the land after cultivating it in 20-25 cm depth in summer.

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