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# THE INFLUENCE OF ROTATION CROPS ON COTTON PLANT PRODUCTIVITY AND TECHNOLOGICAL ATTRIBUTES OF FIBER

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## ABSTRACT
*Basing on the results of conducted field experiments, it can be said that in spite of rotation crop types, they can influence on soil fertility resulting in increase of cotton plant productivity and improvement in technological parameters of fiber. It was determined that when the annual (rotation) leguminous crops soya, mung bean, bean, pea, peanut and green peas were sown, they influenced on fertility of virgin soils, agro-physical and agro-chemical attributes were improved leading to the increase of cotton plant productivity sown after them by 2,1-3,9 c/ha and technological quality parameters of fiber improved.*

**KEY WORDS:** *winter wheat, rotation crop, cotton plant, soya, corn, green peas, mung bean, bean, cotton fiber, productivity.*

## INTRODUCTION

Soil fertility in farming depends on the norms of mineral fertilizers scientifically founded, their proportion, use of organic fertilizers, wide application of rotation, land and water resource-saving and other advanced agro-technologies. Today, the prior tasks in farming are to draw greater attention to cultivation of leguminous, grain and vegetable crops which can save and improve soil fertility, meet the needs of people for food, to insert these crops to rotation and intercrop system and finally to increase land use efficacy in order to implement short rotation systems in irrigated lands.

This scientific work serves in performation of the tasks stated in the decree of the president of the Republic of Uzbekistan from 2017 March 14, №-2832 " About the measures on increasing cultivation of soya crops in 2017-2021 years in the republic", the decree of the Cabinet of Ministers from 2018, February 10, №-105 "About the measures on further increase in soya cultivation capacity in the republic" and other normative documents.

Rotation crops sown after winter wheat remains their crop residues in the soil and save its fertility, improve its agro-physical, agro-chemical, meliorative and ecological state [10].

In Karakalpakstan condition 8 fields were sown with cotton-plant and alfalfa by rotation system (3:4:1:2 and 3:4:1:3), rotation crop was sown in the eighth field, greens were harvested for food and mung bean was sown after it resulting in 8-10 centner/ha (c/ha) yield. Despite Karakalpakstan is the northern part of our country, when mung bean grain was sown as rotation crop by 10 c/ha it showed its peculiarity as prospective crop to be cultivated in southern regions [9].

When mung bean was planted in winter wheat stubble in typical virgin soils of piedmonts of Kashkadarya region as a rotation crop by 400 thousand/pcs/ha norm under 1.07 time, due to rational use of light radiations, the productivity was average 19,3 c/ha, in late sowing (15.07 and 1.08) grain yield was 17,2-15,3 c/ha [2].

Alfalfa leaves more residues in soil than others after harvesting, but according to the requirements of the present day the cultivation of annual leguminous crops after winter wheat is performed to save soil fertility [6].

There are 400 pieces of bacteria in the roots of a plant of soya sown as a rotation crop, their dry mass makes 1,2-2,4 gr [7]. The roots of pea as a main crop keep 14-15 gr biological nitrogen [8].

It was identified that in the system of 2:1 rotation (winter wheat+rotation crop-mung bean: winter wheat+rotation crop-mung bean+intercrop-rye:cotton plant) only winter wheat left stubbles of 12,43-16,80

tons in one hectare at the expense of rotation and intercrops, in 1:1:1 system (winter wheat+rotation crop-mung bean +intercrop-triticale: soya: cotton plant and winter wheat +rotation crop-mung bean: cotton plant: soya) 12,09-16,09 tons of roots and stubbles were left. In the result of rotting and decomposition of some parts of these residues, tillage layer and underground mass of typical virgin, bare and pasture-alluvial soils decreased to 0,02-0,04 c/cm$^3$, the amount of water-resistant aggregates to 2,4-3,7 %, water retentiveness of soil increased relatively by soil types 2,1-14,3 %; 2,5-3,0 %; 6,5-14,2 % [3].

Improved systems of short rotation have been scientifically proven and implemented in Andijan condition to save and improve virgin soil fertility and particular attributes, to increase yield productivity of cotton plant.

## MATERIALS AND METHODS

Considering aforementioned, it is obvious that in 2012-2014 field experiments were conducted, research programme intended to study the impact of short rotation crops on cotton plant growth, development, cotton yield and quality, and to evaluate economical efficacy. It was carried out in virgin soils condition of Andijan region.

The object of the research was virgin soils which have been irrigated for a long time and various leguminous – grain crops.

Our research work was performed according to the methodical manuals and guides of Uzbekistan Cotton-breeding Research Institute, Uzbekistan Plant-growing Research Institute, Uzbekistan Plant Protection Research Institute and Uzbekistan Agricultural Production Research Center (1995-2007).

Field experiments were conducted in 8 variants with 4 repetitions.

Productivity determination after experimental variants and repetitions was analyzed by dispersion method [1].

Agro-chemical [4] and agro-physical [5] traits of soils under the study were checked by standard methods.

## RESULTS AND DISCUSSION

According to obtained data on growth and development of cotton plant sown after rotation crops in experiment fields in order to study the impact of short rotation crops on cotton plant growth and development, cotton yield and quality, it was defined that in the 2nd experimental field on (2014) 1,08 in the control variant the height of main stalk of cotton plant made 81,6 cm, quantity of yield making branches was 14,2 pieces and quantity of unripe cotton bolls was 11,5 pieces, including opened bolls of 4,5 pieces, while sowing cotton plant after rotation crop of corn these parameters were relatively 82,3 cm, 14,5 and 12,0, as well as 4,6 pieces, by this indication we can say that corn absorbs much nutrients from soil.

During the experiments higher indications were observed in the variant of sowing cotton plant after soya or mung bean and it depends on their residues: roots and stubbles and the amount of their content nutriential substances as well. In these variants (3-4) main stalk of cotton plant (1,08) made 83,9-84,6 cm, yield making branches quantity consisted 14,9-14,5 pieces and unripe cotton bolls were of 12,9-1,3 pieces, including opened bolls of 4,7-4,8 pieces. The parameters of other variants were higher than the control variant too, but almost similar to each other. At the beginning and end of field practices the thickness of cotton plants was about 79,4-80,1 thousand/ha in the 2nd field. Consequently, it means that additional cotton yield doesn't depend on plant thickness difference. But the difference on variants showed that in the 2nd field condition the quantity of unripe cotton bolls was 1-2 times more, average cotton yield was1-2 c/ha in all fields.

It should be stated that in the 2nd field condition average mass of cotton per boll showed 4,5-4,8 gr, and by this it is obvious that cotton yield is higher in this field. In the 1st field of experiments in the control variant cotton mass per boll was 5,0; 4,3 and 4,0, average 4,4 gr. Much higher parameters were observed in the variants sown after soya and mung bean, average cotton mass per boll was 4,8-4,8 gr (2nd field), and it was 0,4 ва 0,4 gr higher than control variants, these difference indications were indicated in cotton yield data too.

The data of cotton yield after rotation crops was presented in table-1, in the control variant (without rotation, cotton plant was sown after winter wheat with four repetitions) field average cotton yield consisted 32,9 c/ha. When sown after corn average cotton yield was 34,7 c/ha, and additional yield was 1,8 c/ha. Apparently, less extra yield was obtained from the experimental sowing of cotton plant after the corn, it depends on much nutriential absorption of crop from soil.

In the experiments the highest cotton yield was obtained in the variants of cotton plant cultivation after soya and mung bean, 36,8-36,5 c/ha. Here, extra yield was 3,9-3,6 c/ha. Cotton plant productivity sown after rotation crops was efficient in green pea too, extra cotton yield was 2,9 c/ha. After other rotation crops (bean, pea and peanut) additional cotton yield showed about 2,4 and 2,1-2,5 c/ha relatively.

When technological attributes of cotton yield was analyzed, in control variant the weight of 1000 pieces of cotton seeds was 116,0 gr, fiber length was 33,0 mm, fiber yield 36,1, strength 4,7 g/power, metric no 5850 and cotton micronaire 4,7.

**Table 1**
**Cotton productivity and technological attributes in the experiments. The 2nd field, 2014**

| Vari-ants | Types of rotation crops | Repetitions, c/ha. | | | | Average c/ha. | 1000 pcs of cotton seed weight, gr | Length, mm | Fiber yield, % | strength, g/power | Metric no | Micro-naire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | | | | | | | |
| **1** | **no rotation crops** | 32,3 | 33,2 | 32,8 | 33,4 | 32,9 | 116,0 | 33,0 | 36,1 | 4,7 | 5850 | 4,7 |
| **2** | **corn** | 34,3 | 35,1 | 34,4 | 35,0 | 34,7 | 116,1 | 33,1 | 36,1 | 4,7 | 5840 | 4,7 |
| **3** | **soya** | 36,9 | 36,2 | 37,5 | 36,7 | 36,8 | 116,3 | 33,2 | 36,3 | 4,8 | 5800 | 4,6 |
| **4** | **mung bean** | 37,0 | 36,2 | 36,9 | 36,0 | 36,5 | 116,3 | 33,2 | 36,4 | 4,8 | 5850 | 4,6 |
| **5** | **bean** | 35,1 | 35,3 | 34,8 | 36,0 | 35,3 | 116,0 | 33,2 | 36,1 | 4,7 | 5860 | 4,6 |
| **6** | **pea** | 35,6 | 34,7 | 35,4 | 36,0 | 35,4 | 116,2 | 33,2 | 36,2 | 4,7 | 5870 | 4,7 |
| **7** | **peanut** | 32,3 | 33,2 | 32,8 | 33,4 | 35,0 | 116,2 | 33,2 | 36,2 | 4,7 | 5860 | 4,6 |
| **8** | **green peas** | 34,3 | 35,1 | 34,4 | 35,0 | 35,8 | 116,1 | 33,2 | 36,2 | 4,8 | 5870 | 4,6 |
| $LSD_{05}$ | | | | | | 0,83 | | | | | | |

It should be noted that, technological attributes of cotton fiber of the variant sown after corn was close the control variant's attributes. In the experiment it was observed that the best quality parameters of cotton fiber was in cotton plant sown after soya and mung bean, fiber length was 33,2-33,2 mm, fiber yield 36,3-36,4 % and micronaire 4,6-4,6. These indications were noted to be higher 0,02-0,02 mm, and 0,02-0,03 % than control variant.

## CONCLUSION

According to research results in spite of rotation crop types (except corn) they affect positively to soil fertility resulting in cotton plant productivity after them and qualitative technological attribute of fiber. Under research it was determined that when annual (rotation) leguminous-grain crops soya, mung bean, bean, pea, peanut and green peas are sown, they influence on pasture virgin soils fertility efficiently, improve agro-physical, agro-chemical attributes, increase cotton plant productivity by 2,1-3,9 c/ha sown after them, improve technological quality attributes of cotton fiber as well.

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