

Impact of Irrigation and Nutrition to "Andijon-36" Cotton Species Yield

Rajabov Nurmamat Qudratovich¹, Shamsiev Akmal Sadirdinovich²

¹Independent researcher, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, 100000, Kary Niyazov Street, 39, Uzbekistan

²Department of husbandry and melioration, Tashkent State Agrarian University, Tashkent-100140, University str.,3, Uzbekistan

Abstract: Researches on impact of irrigation and nutrition to "Andijon-36" cotton species yield was carried out in Tashkent Region. Under the condition of typical gray soil in Tashkent Region, investigating water-fertilizer conditions, irrigation amount and duration, seasonal irrigation norms and the optimal water-fertilizer condition (nitrogen, phosphorus and potassium), prior to properly watering "Andijon-36" species cotton, high quality harvests have been obtained at the rate of 27,7-47,9 c/ha on the average 35,3 c/ha with the soil humidity of 65-65-60% according to LFHC, with the leaf cell juice concentration of 9,6-9,8%, at the rate of 10,3-11,9% in the period of blossoming-harvesting and at 12,0-12,9% in the period of ripening, using the nitrogen, phosphorus and potassium at the rate of 190-133-95 kilos.

Keywords: cotton varieties, refraktometer, leaf juice concentration, seasonal irrigation, standard ratio of fertilizer (nitrogen, phosphorus and potassium), irrigation amount, soil agro-physics condition, pre-watering soil humidity, crop density, yield.

1. Introduction

Currently, problems of preventing water insufficiency is one of the most important issues awaiting for a solution in the world, thus they require complex researches, including basic requirements of rational utilization of land and water resources in agriculture, and gaining plenty of high-quality agricultural products.

It is important to pay particular attention to the climatic conditions of the soil and biological features of cotton species while the allocating and renewing cotton species in our country, as well as the quality of the fiber to meet the requirements of the international market. It is also essential to learn Nitrogen, phosphorus and potassium standards and irrigation orders of planting or recommended cotton species, to research the endurance to water insufficiency, and the demand for nutrition of cotton species, especially while water scarcity has been observed in the past few years.

2. Materials and Methods

Taking into account the above defined in the "Program" the field experiences have been conducted in the central experimental fields of Uzbekistan, Cotton Breeding, Seed Production and Agrotechnologies Research Institute, where pre-watered fields of agriculture, groundwater level deeper than the typical gray soil conditions are provided.

The experiment is placed in one group along with 7 options, 3 iterations. Each quantum consists of 8 rows, 4,8 m in width, with a length of 100m, with an area of 480m², and a number of accounts area of 240 m², 4 rows, with width of 2,4 m and a length of 100m. Andijan-36 cotton variety yield with an average cotton fiber, has been comparatively analyzed in two different norms of fertilizer N-160, P₂O₅-112, K₂O-80 and N-190, P₂O₅-133, K₂O-95 kg / ha, according to LFHC in three different irrigations 65-66 % - 60%, 70-70-60, 70-75-60% and compared with the same irrigation regimes, analyzed before the irrigation of cotton

leaf juice concentration at the growth point of the third and fourth leaves, identified by the manual refraktometer [3]. The test system is described in the table 1, 2.

Table 1: Experimental System

№	Cotton species	Pre-watering soil humidity according to LFHC, in %	Standards of mineral fertilizers, kg/ha		
			N	P	K
1	C-6524	70-70-60 CJC	200	140	100
2	"Andijon-36"	65-65-60 CJC	160	112	80
3	"Andijon-36"		190	133	95
4	"Andijon-36"	70-70-60 CJC	160	112	80
5	"Andijon-36"		190	133	95
6	"Andijon-36"	70-75-60 CJC	160	112	80
7	"Andijon-36"		190	133	95

Note: CJC – Leaf cell juice concentration, LFHC – Limited field humidity capacity

Table 2: Terms of the application of mineral fertilizers, (net kg/ha)

Terms of the application of mineral fertilizers	Options 2,4,6			Options 3,5,7		
	N	P	K	N	P	K
	Before Fall plowing	-	75	40	-	100
Along with planting	20	17	-	30	20	-
When 3-4 real leaves appear	20	-	-	30	-	-
When starts	60	-	40	65	-	45
When blossoming starts	60	20	-	65	13	-
Annual amount	160	112	80	190	133	95

3. Results and discussion

Agrophysics of the experimental field soil is the main factor in determining fertility of the soil. The mechanical structure, LFHC, water conductivity, volume weight, soil density, porosity, and their microbiological indicators were studied through phenological observations of cotton growth, relativity of development between 1-3 days of June, July, August, September.

Limited field humidity capacity (LFHC) was 21,0-21,8% at 0-70cm layer, 21,4-22,0% at 0-100cm layer throughout the years. Water conductive was at an average of 891,8-907m³/ha for six hours a day at the beginning of the season in early spring.

It has been observed that cotton growth and development, fertility and ripening are directly dependent on the nutrition and irrigation rate. The impact of water and nutrients to the growth and development of cotton varieties has been

observed at the beginning of the season, especially it has been more vivid at the end of growth period. Over the years at the beginning of September “Andijon-36” main cotton plant height reached to 83,8-96,8cm and the number of capsules were up to 7,6-11,0 as per the observations on options. At the same time, observations on the “C-6524” cotton species showed that it had less accumulation of capsules compared to “Andijon-36” cotton species [2].

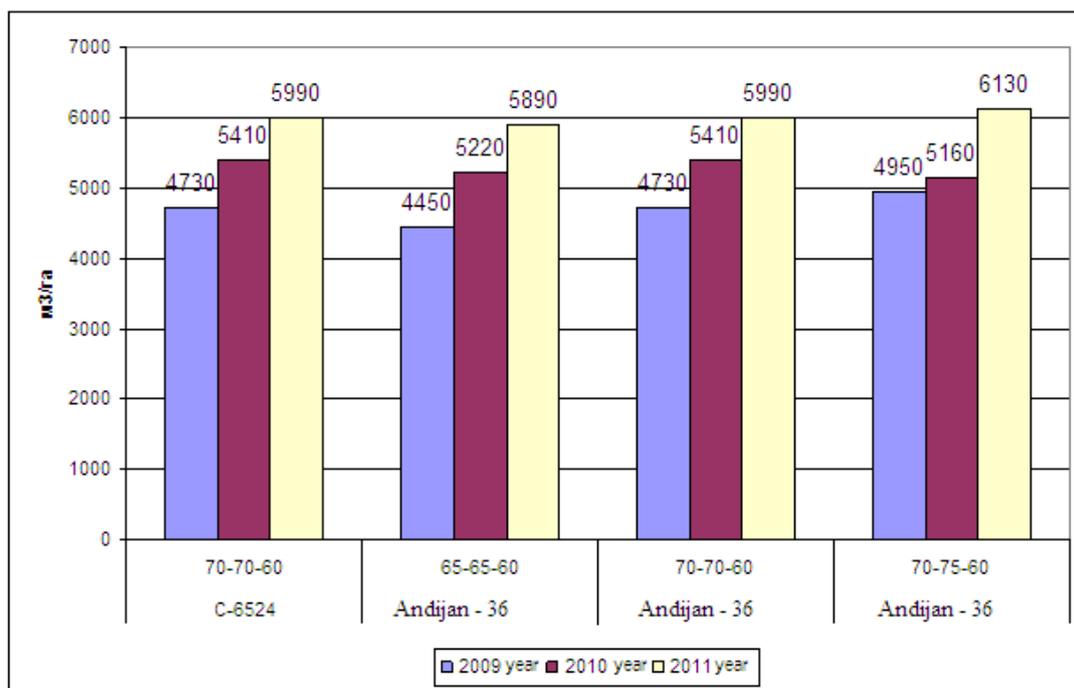


Figure 1: Seasonal irrigation standards of cotton variety, m³/ha

Due to the coming of years during the growth period of options where pre-watering soil humidity was 65-65-60% according to the LFHC, there was 4-6 times irrigation in the system of 1-2(3)-1(2), pre-watering average soil humidity was 59,8-66,4%, one time irrigation was having 810-1180m³/ha, during the season 4450-5890m³/ha of water, irrigation duration of 22-35 hours, in the range of 17-27 days, manual refraktometer (CJC) changed up to 8,6-12,9%. In the options where pre-watering soil humidity was 70-70-60% according to the LFHC, there was 5-7 times irrigation in the system of 1-3(4)-1(2) during the growth period, average soil humidity was 60,5-71,4%, one time irrigation was having 680-990m³/ha, during the season 4730-5990m³/ha of water, irrigation duration of 20-33 hours, in the range of 13-27 days, manual refraktometer (CJC) changed up to 8,5-12,9%. Finally, in the options where pre-watering soil humidity was 70-75-60% according to the LFHC, there was 6-8 times irrigation in the system of 1-4(5)-1(2) during the growth period, pre-watering average soil humidity was 59,4-76,4%, one time irrigation was having 670-880m³/ha, during the season 4950-6130m³/ha of water, irrigation duration of 21-32 hours, in the range of 12-28 days, manual refraktometer (CJC) changed up to 9,0-12,9%. It is described in the figure 1.

It has been detected that the amount of spent water for the same cotton species on the experimental filed depends on

many factors, such as the amount of humidity in the root located layer, water consumption depends on the number, frequency and duration of irrigations, soil humidity reservation, the provision of plant nutrients (nitrogen, phosphorus and potassium) according to the coming of year, weather conditions, qualitative and timely conducting of agricultural activities [1, 4].

High harvesting has been gained with “Andijon-36” cotton species when pre-watering soil humidity was 65-65-60% according to the LFHC, manual refraktometer (CJC) indicators showed 9,6-9,8% until blossoming, blossom-harvest period 10,0-11,9%, ripening period 12,0-12,9% of nitrogen, phosphorus and potassium fertilizers 190-133-95 kg / ha used and in those three years average 35,3c/ha high quality harvest was achieved, during the years pre-harvesting crop thickness consisted of 78,5-100,4 thousand units per hectares. In these options “Andijon-36” cotton species had 147,0-193,7m³/ha water consumption to produce one quintal cotton, pre-harvesting one capsule cotton weight was 4,1-5,0grams throughout the years.

The irrigation orders have impacted on the biological properties and maturation of cotton, it has been proved in our experiments. It has been observed in the cotton species that when irrigation orders were increased from 65-65-60% to 70-70-60%, nitrogen, phosphorus and potassium from

160-112-80kg/ha to 190-133-95kg/ha cotton plant grew higher and with high humidity of 70-75-60% capsules opened comparatively later.

4. Conclusions

According to the results of scientific research under typical gray soils, provided with deep groundwater fields on the basis of information gathered from the three-year period (2009-2011) concluded as follows:

- Within “Andijan-36” cotton species the distribution of water-fertilizer (nitrogen, phosphorus and potassium) standard rates at a significantly reduced number of procedures of irrigation system, irrigation length, the growth of the researched cotton species as per seasonal irrigation norms at acceptable standards, by the phase of development was studied.
- The experienced cotton species “Andijan-36” is observed as having more gross productivity, faster ripening, higher weight of cotton in each capsule as per the pickings compared to specimen C-6524 cotton sort.
- -in “Andijan-36” cotton species high quality yield up to 27,7-47,9 c/ha was achieved with acceptable 65-65-60% nitrogen, phosphorus and potassium ratio 190-133-95 kg/ha.
- -“Andijan-36” has been justified to be more resistant for the thirst compared to “C-6524” cotton sort.
- -in the typical gray soils with average heavy mechanical components where the underground water is deep, on the fields where cotton varieties are planted as per the planting scheme of 60cm row, it is necessary to provide not more than 60-100meters of furrow length according to the coming of years, water supply.

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