STUDY REGARDING THE INFLUENCE OF THE AGROFIELD AND THE CLIMATIC CONDITIONS FROM TIMISOARA ON RAW COTTON PRODUCTION TO SOME COTTON GENOTYPES (GOSSYPIUM HIRSUTUM SP.)

Liliana BABA [1], Valeriu TABARA [2], Iuliana CRETESCU [2]

[1]Children's Palace Timisoara,
[2]Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara - 300654, 119 Calea Aradului street, Timişoara, Romania
E-mail: baba.liliana@gmail.com

Abstract. *The aim of the present investigations was to determine the influence of agrofield on raw cotton production to three cotton genotypes (Gossypium hirsutum sp.): Marismas and Coko genotypes from Greece and Canada genotype from the USA, in the year 2010 of investigation. Investigations made to Experimental and Didactical Station of Timisoara, the experimental field being placed on a cambic chernozem soil, in climatic conditions of Timisoara in the year 2010. The experimental factors established were: Factor A - agrofield and Factor B - genotype. Factor A with six graduation: a_1 - $N_0P_0K_0$, a_2 - $N_{30}P_{30}K_{30}$, a_3 - $N_{60}P_{30}K_{30}$, a_4 - $N_{90}P_{60}K_{60}$, a_5 - $N_{120}P_{60}K_{60}$, a_6 - $N_{30}P_{30}K_{30}$ and agrofield fertilization. Factor B with three graduation: b_1 – Canada - the USA; b_2- Marismas- Greece; b_3- Coko- Greece. Production analysis of raw cotton obtained under agrofield influence emphasized differences among genotypes. In the climatic conditions of Timisoara in the year 2010, the average productions of raw cotton were: Grecian genotype Marismas – 1992 kg/ha, Grecian genotype Coko - 1833 kg/ha and Canada genotype - 1857 kg/ha. The biggest production at Marismas genotype was obtained on agrofield a_4 - $N_{90}P_{60}K_{60}$ (relative 2147 kg/ha cotton production) comparative with agrofield a_1 - $N_0P_0K_0$. The biggest production for Canada genotype was obtained on the agrofield a_4- $N_{90}P_{60}K_{60}$ (2047 kg/ha cotton production). The biggest productions at Coko genotype was obtained on the agrofield a_4 - $N_{90}P_{60}K_{60}$ (2033 kg/ha cotton production). The obtained results were statistically processed the analysis of variance and differences at $p<0.05$ were considered statistically significant. The three cotton genotypes presented a good adaptability to weather conditions from Timisoara in the year 2010. The weather conditions of year 2010 determined low productions of raw cotton to all the cotton genotypes face to the ones of 2008, the entrance in vegetation of plants with a delay of approximate of 14 days, it was the dominant factor. Investigation brought a data base of valorous reference about cotton cropping in Western of Romania.*

Key words: *raw cotton, production, climatic conditions, agrofield.*

INTRODUCTION

A study on the amount of textiles used by humanity for unsurpassed clothing confirm the share of cotton: cotton used 53.7 %, 14.5 % wool, 13.3 % jute, 6.9 % hemp, 6.3% in, 3.9% artificial silk, 1.1 % cello-fiber, 0.3 % natural silk. Cotton is used in very different areas, main sector remaining textile industry. For over 120 years, cotton is known as the cultivation plant on the territory of Romania. All the varieties that can be grown in our country are from the genotype *Gossypium hirsutum L*. The analysis of the vegetation conditions for cotton is done during the period May-October; the active vegetation period is between 1st of May and the first frost of autumn. The sum of degrees for the varieties grown in our country is over 3000°C and for the late varieties of the genotype *Gossypium hirsutum* it reaches 3600 - 3700 °C. Cotton has moderate requirements regarding water; the sweat coefficient for our country is 350 - 650 units of water for a unit of dry substance. Cotton has the ability to adapt to lower moisture;

from hygrophilous looking plant receives fast enough xerophyte attributes of plant. Harvesting time in our country is before the first frost.

The data in figure 1. and table 1 characterizes the monthly average temperatures and the monthly precipitations recorded at the meteorological station from Timisoara during the months April - October 2010.

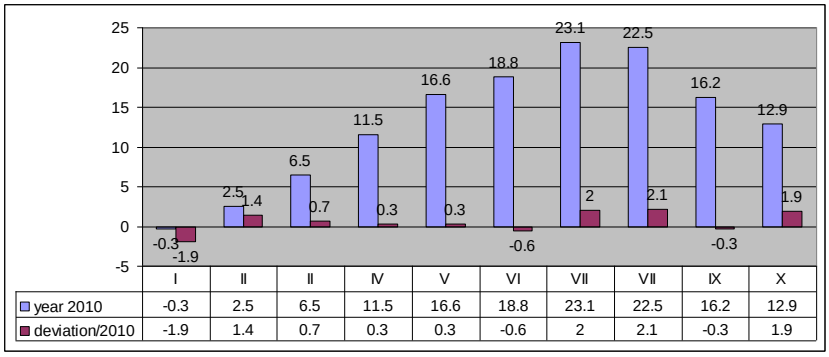

Figure 1. Graphic of the monthly average temperatures in comparison with the yearly average, recorded from the Meteorological Station from Timisoara (Banat-Crisana regional Weather Center Archive) (2010)

For the year 2010, we can say that from the point of view of precipitations, it was a rich year in comparison with the multiannual precipitations, there amount was 694.8 mm. In table 1., we can observe that considerable precipitation fell in June, reaching a value of 131.30 mm, the yearly average being exceeded with 51.7 mm. The low precipitation recorded in September (40.70 mm) have favored the rearing and opening period of the cotton capsules. The most swears month of the studied year (2010) was July when the amount of precipitations was 24.7mm.

Table 1.

Monthly precipitations recorded at meteorological station from Timisoara in 2010

Year	I	II	III	IV	V	VI	VII	VIII	IX	X
2010	65	76.5	31.3	56.6	122.7	131.3	24.7	81	40.7	65
Multiannual averages	39.1	38.3	33.9	46.8	63.1	79.6	62.4	51.4	42.1	42.2
Deviation/2010	25.9	38.2	-2.6	9.8	59.6	51.7	-37.7	29.6	-1.4	22.8

The aim of the present investigations was to determine the influence of agrofield on raw cotton production to three cotton genotypes (*Gossypium hirsutum sp.*): Marismas and Coko genotypes from Greece and Canada genotype from the USA, in climatic conditions of Timisoara in the year 2010.

MATERIAL AND METHODS

The main purpose of that work was to emphasize the behavior of three cotton genotype in Timisoara climatic conditions, Marismas and Coko genotypes from Greece, Canada genotype from USA. The experimental field was placed on a terrain which appertained to Didactic Station and Experimental Timisoara.

The experience of bifactorial type was placed in field after the subdivided parcels method. The existing factors experimental were: Factor A- agrofield and Factor B- genotype. The experimental factors were:

- Factor A: agrofield (a_1 - $N_0P_0K_0$, a_2 - $N_{30}P_{30}K_{30}$, a_3 - $N_{60}P_{30}K_{30}$, a_4 - $N_{90}P_{60}K_{60}$, a_5 - $N_{120}P_{60}K_{60}$, a_6 - $N_{30}P_{30}K_{30}$ and foliar fertilization.

- Factor B: Genotype (b_1 - Canada - American provenience; b_2 - Marismas - Greece; b_3 Coko - Greece).

The obtained results were statistically processed using the analysis of variance (Ciulca, 2006).

RESULTS AND DISCUSSIONS

In table 2. is presented the summary of raw cotton production from the six agrofields for the three varieties in 2010 under the climatic conditions from Timisoara.

Table 2.

The effect of the agrofield on the raw cotton production for the three cotton varieties in 2010 under the climatic conditions from Timisoara

The averages of factor A						
FACT A AGROFIELD	FACT B - GENOTYPE			Production kg/ha	%	Difference/ Significance
	Marismas	Canada	Coko			
a_1	1701	1646	1686	1678	100	–
a_2	2000	1814	1767	1860	111	182^{***}
a_3	2043	1998	1780	1940	116	262^{***}
a_4	2147	2047	2033	2076	124	398^{***}
a_5	2110	1991	1952	2018	120	340^{***}
a_6+foliar fertilization	1951	1646	1777	1791	107	113^{**}

LSD 5%= 65 kg/ha; DLS 1% = 86 kg/ha; LSD 0.1% = 114 kg/ha.

Table 3.

The effect of the genotype on the raw cotton production for the three cotton varieties in 2010 under the climatic conditions from Timisoara

The averages of factor B			
FACT B GENOTYPE	Marismas	Canada	Coko
Production kg/ha	1992	1857	1833
%	100	93	92
Difference/ Significance	-	-135^{0}	-159^{00}

LSD 5%= 112 kg/ha; DLS 1% = 150 kg/ha; LSD 0.1% = 197 kg/ha

On agrofield a_1-$N_0P_0K_0$ is obtained a yield of 1678 kg/ha raw cotton. Increasing the doses of nitrogen at 90 kg/ha on double application of phosphorus and potassium leads to the increase of production on the agrofield a_4-2076 kg/ha, an increase of 394 kg/ha, 24% higher

compared to the unfertilized variant. It is the best production recorded from the six experimental productions. On agrofield a_2-$N_{30}P_{30}K_{30}$ where they have applied 30 kg/ha s.a. nitrogen on a constant background of phosphorus and potassium (30 kg/ha s.a. each), we notice a production increase of 182 kg/ha, statistically considered as very significant. On agrofield a3 there is a yield of raw cotton of 1940 kg/ha, with 16% more than the reference production compared to which there is a production increase of 262 kg/ha, statistically considered as very significant. On agrofield a_5 the raw cotton production is 4% higher than that achieved on agrofield, 20% higher than on agrofield a1, compared to which there is a production increase of 340 kg/ha, statistically considered as very significant. In the case of the agrofield a_6-$N_{30}P_{30}K_{30}$ + foliar fertilization, the raw cotton production is only 7% higher than the one obtained on the reference agrofield (1678 kg/ha), the production increase of 113 kg/ha is statistically considered as distinctively significant. The analysis of the raw cotton productions obtained under the influence of genotype highlights significant differences between them. Under the meteorological conditions from Timisoara in 2010, the average yields of raw cotton are presented in table 3. The best result is obtained at Greek genotype Marismas-1992 kg/ha. For the Canada and Coko varieties the raw cotton yields are: 1857 kg/ha for genotype Canada and 1833 kg/ha for Coko genotype, the differences in production of 135 kg/ha, respectively 159 kg/ha compared to the average yield of Marismas genotype are statistically considered as significant and distinctively significant. And a separate analysis was made on the behavior of each genotype under the influence agrofond.

Tabel 4.

Raw cotton production (kg/ha) under the agrofield influence for Marismas genotype in 2010 in the meteorological conditions from Timisoara

AGROFIELD	PRODUCTION kg/ha	%	Diference/ Significance
a_1	1701	100	-
a_2	2000	117	299***
a_3	2043	120	342***
a_4	2147	126	446***
a_5	2110	124	409***
a_6+foliar fertilization	1951	114	250***

LSD 5% = 106 Kg/ha; LSD 1%= 141 kg/ha; LSD 0.1% = 185 kg/ha

In table 4. we present the production obtained for Marismas genotype in 2010. The analysis of the results shows that the agrofield has a favorable influence on the raw cotton yields for Marismas genotype. Depending on the agrofield, the raw cotton production can increase from 1701 kg/ha on agrofield a1 to 2147 kg/ha on agro - fond a_4. As a percentage the production increases compared to the reference one with 17% on agrofield a_2, 20% on agrofield a_3, 26% on agrofield a_4, and 24% on agrofield a_5. On agrofield a_6 the average production of raw cotton is only 1951 kg/ha, with 14% higher than the production obtained on the reference agrofield. The production increases on the agrofields varies between 299 kg/ha on agrofield a_2 and 446 kg/ha on agrofield a_4. On agrofield a_6 there is an increase of production of 250 kg/ha compared to the reference. It should be noted that the production increases on all agrofields are statistically considered as very significant.

Table 5.

Raw cotton production (kg/ha) under the agrofield influence for the Canada genotype in 2010 in the meteorological conditions from Timisoara

AGROFIELD	PRODUCTION kg/ha	%	Diference/Significance
a_1	1646	100	-
a_2	1814	110	168*
a_3	1998	121	352***
a_4	2047	124	401***
a_5	1991	120	345***
a_6+foliar fertilization	1749	106	103

LSD 5% = 150 kg/ha; LSD 1% = 200 kg/ha; LSD 0.1% = 263 kg/ha

In table 5. we present the average yields obtained for Canada genotype under the agrofield influence in 2010 in the meteorological conditions from Timisoara. Compared to the reference genotype Marismas, the average yield levels of raw cotton from Canada genotype are lower. Also the Canada genotype gross raw cotton yields are strongly influenced by the agrofield. The Canada genotype raw cotton productions increase on all agrofields compared to the unfertilized variant (1646 kg/ha): 1814 kg/ha on agrofield a_2, 1998 kg/ha on agrofield a_3, 2047 kg/ha on agrofield a_4, 1991 kg/ha on agrofield a5 and 1749 kg/ha on agrofield a_6. The percentage increases of raw cotton productions according to the agrofield are: 10 % on agrofield a_2, 21% on agrofield a_3, 24% on agrofield a_4, 20% on agrofield a_5 and 6 % on agrofield a_6. The production increases obtained under the agrofield influence varies from 168 kg/ha on agrofield a_2 up to 401 kg/ha on agrofield a_4. It should be mentioned that on the agrofields a_2, a_3, a_4, a_5 and a_6 the production increases obtained compared to the reference one (unfertilized) are statistically considered as significant. The raw cotton production of Canada genotype is also influenced by the positive foliar fertilization (%), i.e. an increase of 103 kg/ha compared to the reference variant, uninsured from statistical point of view.

Table 6.

Raw cotton production (kg/ha) under the agrofield influence for the Coko genotype in 2010 in the meteorological conditions from Timisoara

AGROFIELD	PRODUCTION kg/ha	%	Diference/Significance
a_1	1686	100	-
a_2	1767	104	81*
a_3	1780	105	94**
a_4	2033	120	347***
a_5	1952	115	266***
a_6+foliar fertilization	1777	105	91*

LSD 5% = 70 kg/ha; LSD 1% = 93 kg/ha; LSD 0.1% = 122 kg/ha

In table 6 we present the average raw cotton productions of Coko genotype obtained in Timisoara under the conditions of 2010. In the case of Coko genotype the raw cotton productions are much lower than those obtained for Canada genotype and approximately equal to those of the Marismas genotype. From the analysis of the production results we can say that, in the case of the Coko genotype, the raw cotton production is positively influenced the nitrogen doses applied on agrofield. Depending on the agrofield, the raw cotton productions are increased from 1686 kg/ha for the unfertilized variant to 2033 kg/ha on agrofield a_4. Between the six agrofields, taking into consideration the raw cotton production, we can highlight the

agrofield a_4 where the obtained production is 2033 kg/ha, with 20% higher than the production obtained for the reference variant (a_1). Compared to on agrofield a_4 the production increase is 347 kg/ha which is statistically considered as very significant. In the case of the agrofield where foliar treatment is applied, the raw cotton production reaches 1777 kg/ha, with a production increase of 105 kg/ha, compared to 1686 kg/ha on the unfertilized reference agrofield, considered significant from statistical point of view. Under the conditions of 2010 we can distinguish two agrofields with higher influence on the raw cotton production for Coko variant. These agrofields are a_4 with a production of 2033 kg/ha of raw cotton and a_5 with a production of 1952 kg/ha of raw cotton, with a production increase of 266 kg/ha, statistically considered as very significant.

CONCLUSION

1. The analysis of raw cotton production obtained for the three varieties under the genotype influence shows differences between the six studied agrofields

2. The nitrogen doses applied on the agrofield, between 30 kg/ha s.a. and 100 kg/ha s.a. on a 30 kg/ha phosphorus and potassium basis, respectively 60 kg/ha phosphorus and potassium determines production increases of raw cotton, fibers and seeds;

3. The nitrogen dose applied on the agrofield (a_4-$N_{90}P_{60}K_{60}$), between 90 kg/ha and 100 kg/ha on a 60 kg/ha phosphorus and potassium basis determines maximum raw cotton productions.

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