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Research on the Influence of Technology on the Rape Crop Production

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Abstract. Major effects of global pollution: desertification, acid rain, biodiversity loss, global warming, the issue of exhaustion of fossil fuels, have caused the scientific community to find solutions to limit environmental degradation. Under the circumstances call from renewable energy sources and environmentally friendly to replace fossil fuels, is one of the main actions in the energy strategies of the EU countries. Crop area and production of energy in the EU, but in our country, the production of bioethanol and biodiesel from renewable biomass is growing, especially areas planted with rape. It is necessary to intensify research on rape culture, the influence of technology on qualitative and quantitative parameters.

Keywords: energy crops, rape, sustainable development, bio-fuels, global warming

INTRODUCTION

Research in recent years have shown that the solar energy stored in biomass through the process of assimilation of chlorophyll can be a source of renewable and clean energy, thus representing an alternative to fossil fuels. Using bioethanol in pure form or mixtures of different proportions of fossil fuels is the most efficient both economically and environmentally, in terms of preserving natural resources and environmental protection.

Given the climatic conditions, agricultural and socio-economic potential of our country, rapeseed oil and its derivatives are among the most suitable biofuel oil with sunflower and soybean. Rape culture expansion is induced by agro-technical and economic advantages on the one hand, but on the other hand, the knowledge of genetic engineering has allowed the creation of new varieties resistant to winter and shaking, with low acid content and drought resistant.

Rapeseed oil used as biofuel, is superior compared with sunflower oil and compared to diesel, has a lower content of carbon and hydrogen, contains oxygen, which promotes burning and contains no sulfur, thus reducing pollution.

Regular analysis of the evolution of climatic factors is important because data from the literature point to global warming.

The use of climate resources with maximum efficiency increases agricultural production, without additional energy consumption. This is possible by linking technological elements and judicious zoning varieties and hybrids in cultivation areas of environmental parameters (Luca and Nagy, 1999; Luca *et al*., 2008).

The thermal analysis in Turda during 1978-2010 - in the mean annual temperature evolution - there is a growing trend, more evident in the range 2002-2010 (Fig. 1).

Changes in climate regime falls in the global context, but with the customization of the geographical region in which the country (Sandu, 2007). Climate data shows a progressive warming of the atmosphere and a significant reduction in rainfall.

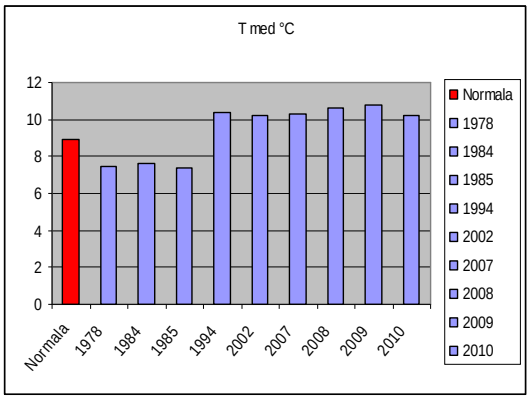

Fig. 1. Evolution of medium annual temperature (° C) (Primary data source: Meteorological Station Turda)

Regarding the evolution of rainfall in Turda, there is a high level of rainfall between 2006-2010 compared to average 1961-1990, as a result of imbalances caused by global warming climate.

In the period, annual average temperature in Turda increased by 0.5°C, the characteristic for the whole country, observing, in terms of seasonality, particularly significant heating in winter and summer season.

Due to these reasons, it is necessary to study how technological factors influence the production of rapeseed in order to establish the mode of action on the quantity and quality of rapeseed production.

MATERIALS AND METHODS

Researches on the influence of irrigation, biological material and density on the production of rape were made in a trifactoriale experiences, experimental factors studied and their graduations are summarized in Table 1.

Tab. 1

Summary of the experimental factors

Analyzed factors	Graduations
Factor A - Irigation regime	a_1 – non-irrigated
	a_2 – irrigated
Factor B - Variety	b_1 – variety Bristol
	b_2 – variety Capitol
	b_3 – variety Contact
Factor C - Density	c_1 – density 100 b.g./m2
	c_2 – density 150 b.g./m2
	c_3 – density 200 b.g./m2

Field experimental research that took place is situated in the village Viişoara, near the town of Turda - Cluj.

Experimental scheme was chosen to enable uniform distribution of water and can provide accurate measurement as the amount of water applied would not be too high.

A rectangular shape was selected for test plots, comparative cultures were placed in polifactorial system with subdivided plots the regime of water factor A factor B is variety,

especially biological material and factor C - plant density. For each test fields were provided three repetitions.

Experiments have contained a number of three repetitions (n = 3), the number of variants analyzed in experiment is 18 (v = 2 x 3 x 3), the total number of experimental plots was 54 (18 x 3). Experience scheme was thus made that created the possibility distribution as uniform and precise measurement of water to ensure proper isolation of variants in space

RESULTS AND DISCUSSION

Experiences were made during agricultural years 2009 - 2010, statistical interpretation was based on analysis of variance on the interaction influence of three factors upon the production of the experimental research conducted annually (Ardelean, 2009), and the calculation was performed both individually and for interaction between these factors, namely:

- irrigation regime x variety;
- irrigation regime x thickness;
- density x variety;
- irrigation regime x variety x density;

Average yield obtained in 2009 to study hybrids is 1155.47 kg / ha.

There were differences within the same year, between the yields achieved in irrigated variants (a_1 graduation) and irrigation (graduation a_2) (Fig. 2). Thus, the average yield in irrigated version is 1553.89 kg / ha in irrigated version is 1934.82 kg / ha, there was an increase irrigated variant distinct significantly from 380.93 kg / ha (24.5%).

Compared to the average country in 2009 to rape culture, 1357 kg / ha (MARD) the results of experiments in Turda is as follows:

- irrigated production registered version is 14.3% higher than the national average;
- irrigated production registered version is 42.5% higher, confirming the quality culture in the research conducted.

Average value recorded in the country in 2010 on rape culture, 1614 kg / ha (MARD) experimental results show that the irrigated variants are 14.10% and 33.72% in the irrigated variant.

Analysis of the results presented in Figure 3 demonstrates that the variety (biological material) makes a positive contribution to a highly statistically significant difference on production recorded rape culture.

Compared with average production in the country, 1357 kg / ha in crop year 2009 varieties studied showed the following average yields relative: 2.10% higher variety Bristol, variety Capitol 47.6% higher, Contact 35, 94% higher as the varieties recommended for use widely studied.

In 2010 (Tab. 2) yields registered varieties studied show a positive difference, very statistically significant: 42.89% variety Capitol with higher and 25.68% Contact variety.

Synthesis of experimental observations on the influence of culture density on output recorded rape clearly indicates that the three variants ranks in different groups, stating that the density is a factor to be taken into account to achieve the certainty of rape culture in the review.

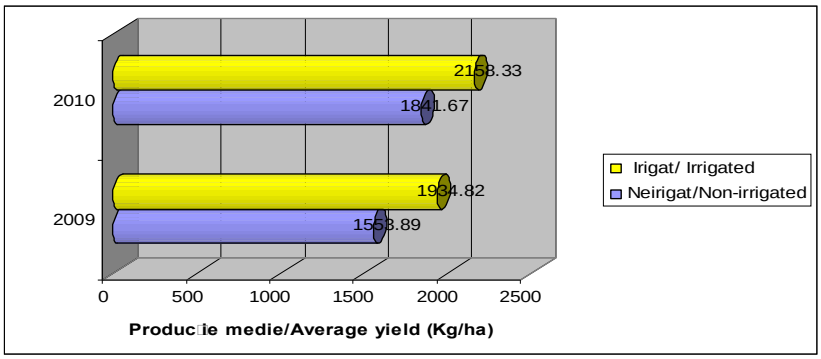

Fig. 2. The average yield of rapeseed (kg/ha) obtained, depending on the factor irrigation regime

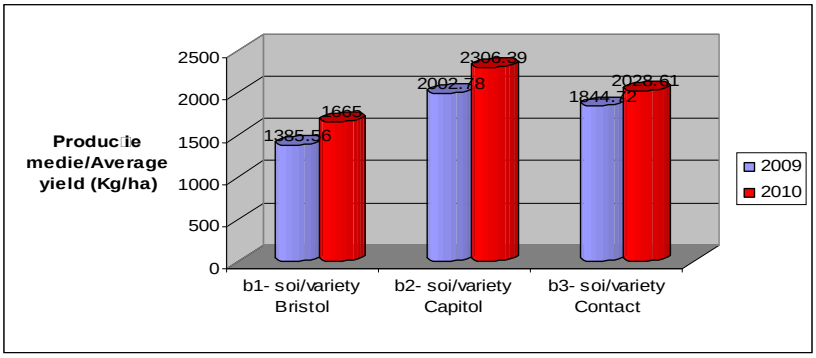

Fig. 3. Influence on the production of rapeseed varieties, Viişoara, 2009

Tab. 2

Influence on the production of rapeseed varieties, Viişoara, 2010

Variety	Medium production (t/ha)	Relative production (%)	± d (Kg/ha)	Significance of the difference
b_1- variety Bristol	1665.00	100.0	133.1	-
b_2- variety Capitol	2306.39	138.5	641.39	***
b_3- variety Contact	2028.61	121.8	363.61	***
DL (p 5%)		67.59		
DL (p 1%)		98.32		
DL (p 0.1%)		147.47		

Analysis of experimental factors x B interaction, irrigation x variety of rapeseed production in culture in conditions of Viişoara indicate the following (Fig. 4):

• Bristol variety: from the control variant x Bristol irrigated, irrigation system experimental factor in graduation a^2 - irrigation has a significant influence, leading to a positive output gap of 356.67 kg / ha, 29.5% higher, a significant difference positive in 2009 and in 2010, a positive output gap 315.56 kg / ha, an increase of 20.9%.

• Variety Capitol: to control variant irrigated experimental factor x Capitol irrigation regime graduation a^2 - irrigation has a significant influence, leading to a positive output gap of 337.78 kg/ha, 18.4% higher, a significant positive difference in 2009 and in 2010, a positive output gap 502.78 kg/ha, 24.5%, significantly distinct positive difference.

• Variety Contact: to control variant x Contact irrigated, irrigation system experimental factor in graduation a^2 - irrigation has a significant influence, leading to a positive output gap

of 448.33 kg/ha, 27.7% higher, a distinct difference significantly positive, and in 2010, a positive output gap is 131.67 kg/ha.

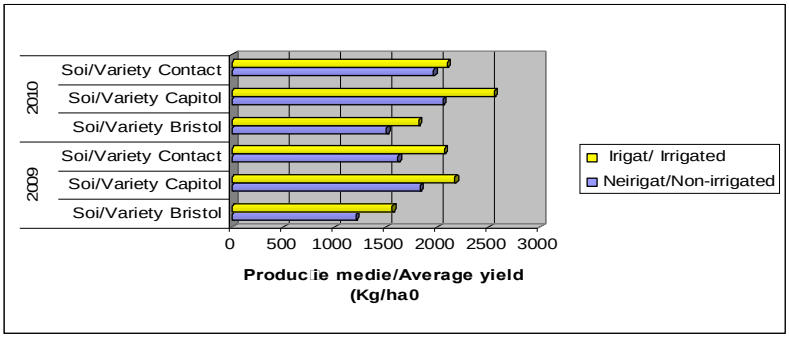

Fig. 4. Influence of the interractions of factors A x B, irrigation to variety on rapeseed yield, in Viişoara

Comparative analysis of data obtained clearly show that in each of the years of experience in alternative irrigated crop yields were significantly higher compared with non-irrigated variant (Fig. 5).

Highest values were recorded for Capitol in version irrigated variety in 2010 at a density of 150 bg/m^2 (2306.39 kg/ha). 2009 was one of the worst years for rape, being less favorable climatic conditions of culture, reflected the results obtained in irrigated variant (1553.89 kg/ha) than in 2010 (1841.67kg/ha).

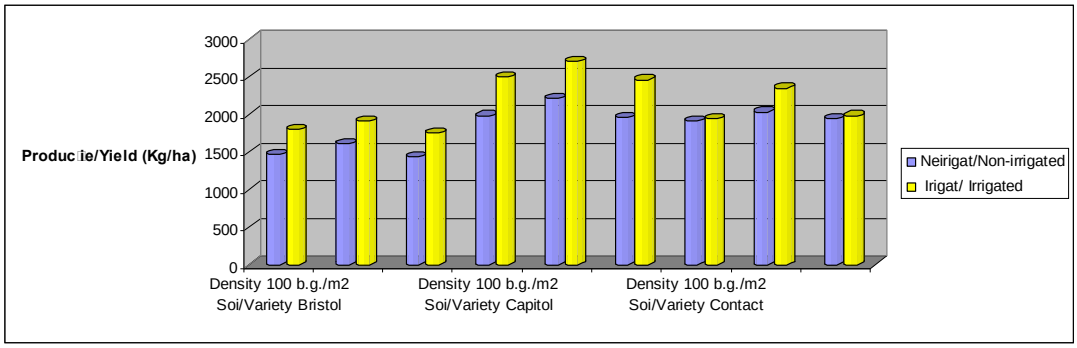

Fig.5. The influence of the irrigation regime in interaction with the experimental factors variety and density of plants on the rape productions (Viişoara, 2009)

CONCLUSIONS

Analyzing the results for production in the experimental field conditions Viişoara, we can conclude the following:

- Irrigation system: any graduation experimental variety and density factors were recorded higher production under irrigated variant, clearly highlighting the contribution of irrigation and its importance to the rape culture. Irrigation brings a very significant positive contribution to the production obtained good yields recorded varieties studied.

- Of the varieties studied the best results in terms of productivity, were recorded with Capitol variety making it suitable for the study area.

- Positive significant differences were obtained in variety and density of 150 Capitol bg/m^2 and Contact 150 bg/m^2 variety.

The evolution of comparative research variances during 2009-2010 showed higher values for the factor under irrigation in each of the years of study compared to experimental factors variety and density shows clearly the need for irrigation in conditions of rape culture Viişoara to ensure a culture of rape with high productivity.

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