

## THE INFLUENCE OF CLIMATIC CONDITIONS ON THE PRODUCTION OF TWO ROW SPRING BARLEY FROM TERRITORY OF SISTAROVAT

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**ABSTRACT-** The influence of climatic conditions on the production of two row spring barley from territory of Sistarovat

The objective of this investigation was finding out the impact of climatic conditions (temperature, precipitations) on spring barley grain yield (*Hordeum vulgare distichum*). The trials were set up in the 2008–2010 year crop in the Sistarovat area (Lat: 46,01; Lon: 21,74; average annual temperature 10.3° C, annual precipitation sum de 594 mm). Three spring barley varieties (Annabell, Cristalia, Kompact) were selected for testing. The soil of the experimental field is preluvosoil, slightly gleyed, with medium fine texture (clay loam). The experimental years vary widely, they are influenced by temperature, and precipitation.. The 2008/2009 agricultural year was a droughty year with a negative influence on grain yield, compared with 2009-2010 agricultural year, when the quantity of precipitations was higher, this year being favorable for spring barley production.

**Keywords:** yield, spring barley, precipitations, temperatures

### INTRODUCTION

Today the beer production in Romania is constantly growing. Inevitably this leads to constant demand of breweries for the increasing amounts of malt that can be imported or it came from local production (TARAU et. al, 2000).

Climatic conditions are one of the important factors that may influence positively or negatively barley productions. Thus, the temperature is thermal resource of the territory and one of the most important edaphic factors that determine the geographic propagation area of certain species, influencing their physiological process as well as photosynthesis, respiration, perspiration and root system development (PRZULJ, 1999).

The literature shows that temperature, as ecological factor, acts differently on the autumn and spring barley forms. Barley plants are very sensitive when the temperature drops suddenly, especially before twinning and hardening period. Spring barley is more sensitive to low temperatures of -4°C and seldom -9°C (PIRŞAN, 2003).

As a free ecological factor, hydric resource, respectively the amount of precipitation fallen during a calendaristical year in different seasons is one of the determining factors with a strong influence on the plant physiology development.

### MATERIALS AND METHODS

The study was conducted on the territory of Sistarovat from Arad county, during the years 2008–2010 in order to observe the influence of climatic conditions on yield for three spring barley varieties: Annabell, Kompact and Cristalia. By its geographical position, the considered territory, situated in the middle of the northern hemisphere between 46.01° and 21°74' east longitude, has a great diversity of ecological conditions

caused by the great variability of all factors, which are in competition for the environment where plants grow and give productions.

The soil of the experimental field is preluvosoil, slightly gleyed, with medium fine texture (clay-loam).

The trials were organised by the method of subdivided parcels using a bifactorial field trial, in three replicates with the following experimental factors:

Factor A - the cultivar

a1- Annabell

a2- Kompakt

a3- Cristalia

Factor B - fertilized doses

b1- N40

b2- N60

b3- N80

b4- N100

Before sowing the field was ploughed with a disc harrow to refine the seed bed and the sowing period was 15 March.

## RESULTS AND DISCUSSION

The climate of the area is characterized by multi-annual averages of temperature and precipitation recorded at weather station from Arad. Thermal resource (*Fig.1*) shows in the investigated area a highly variable expression, with a strong influence on plant growth and development, easy to prove.

In 2008/2009 agricultural year in terms of thermal regime was registered a deviation from the multiannual average ( $10.3^{\circ}\text{C}$ ) by  $+1.3^{\circ}\text{C}$  as for the 2009/2010 agricultural year when temperature average recorded was  $11.7^{\circ}\text{C}$  with a average deviation of  $1.4^{\circ}\text{C}$  compared to multiannual average which has a value of ( $10.3^{\circ}\text{C}$ ).

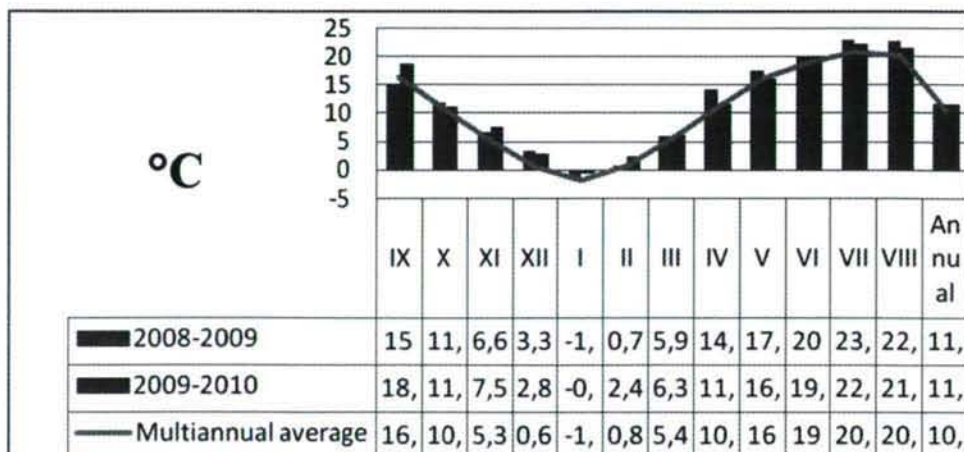


Figure 1: Monthly average temperature, annual and multiannual [ $^{\circ}\text{C}$ ] Meteorological station ARAD

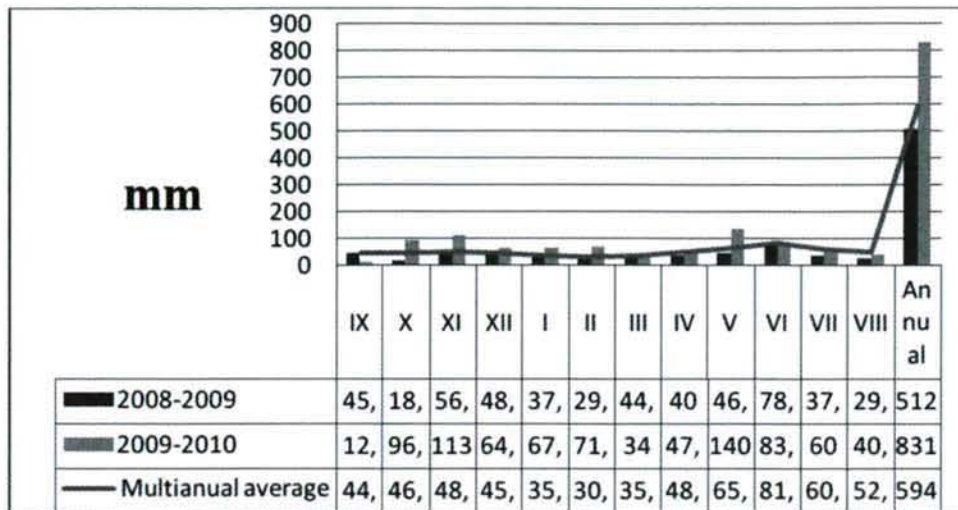


Figure 2: Monthly average rainfall, annual and multiannual [ $^{\circ}$  C]  
Meteorological station ARAD

In terms of rainfall in the agricultural year 2008-2009 the annual rainfall was only 512 mm by 82 mm less precipitation than the annual average which has a value of 594 mm. The amount of rainfall throughout the growing season provided the minimum necessary requirement of 400 mm rainfall. In agricultural year 2009-2010 the annual rainfall recorded 831 mm.

Compared to the annual average (594 mm), we can observe a deviation of +237 mm. Due to its short growing season, spring barley requirements from moisture in most years are met by rainfall during the growing season and by those accumulated in the soil in cold season.

Soil moisture influences the evolution of barley and barley yields at different stages of growth.

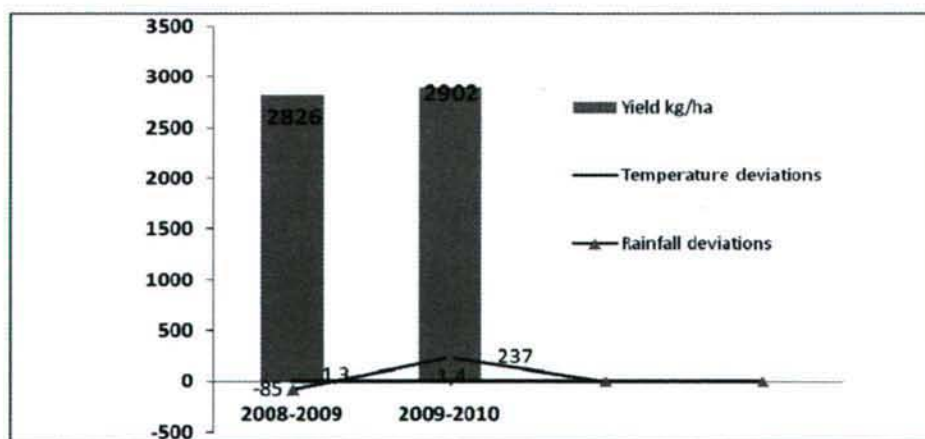


Figure 3: The influence of climatic conditions on Annabell spring barley variety in the Sistarovat area

Figure 3. shows that for the Annabell variety a lowest yield registered in agricultural year 2008-2009 with a value of 2826 kg/ha, when the temperature registered a deviation of +1.3 $^{\circ}$ C from the multiannual average 10.3 $^{\circ}$ C and amount of

rainfall was below multiannual average with a deviation of -85 mm. The agricultural year 2009-2010 recorded a higher production value of barley with 2.7%, compared with agricultural year 2008-2009, when the temperature deviation did not exceed 1.4 ( $^{\circ}\text{C}$ ) and the amount of rainfall was well above the value of multiannual with a deviation of +237mm.

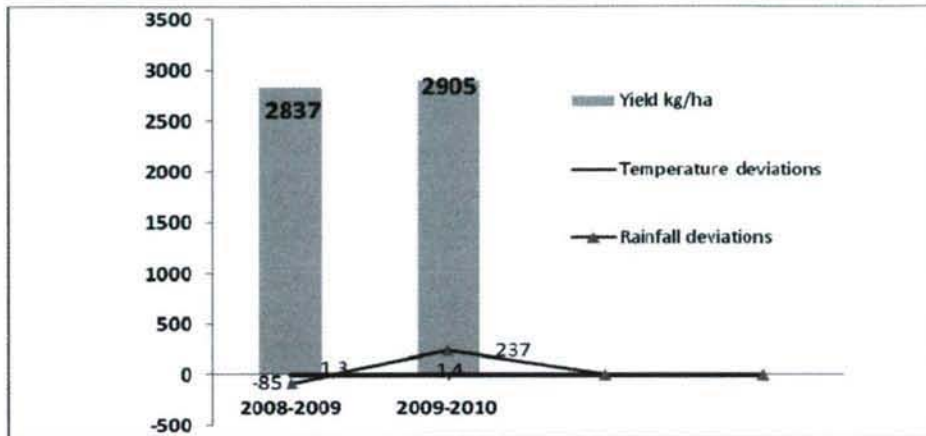


Figure 4: The influence of climatic conditions on Cristalia spring barley variety in the Sistarovat area

Figure 4 shows the influence of temperature and rainfall on the production of Cristalia variety spring barley. Thus, agricultural year 2009-2010 registered the highest production value of 2905 kg/ha when rainfall amount (831 mm) exceeded the multiannual average (594mm), registering a positive deviation (237 mm). In agricultural year 2008-2009, due to less favorable weather conditions barley yield, was lower, registering a value of 2837 kg/ha, when the average temperature  $11.6^{\circ}\text{C}$  recorded higher values compared to the multiannual average  $10.3^{\circ}\text{C}$ , registering a positive deviation  $1.3^{\circ}\text{C}$ .

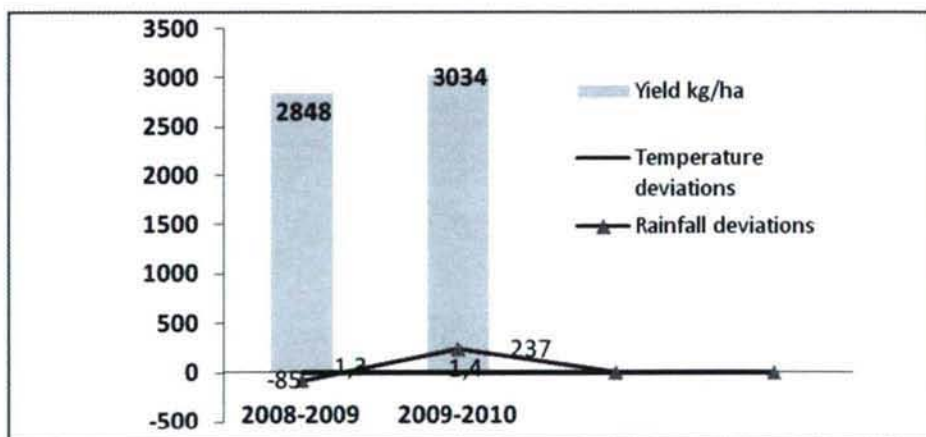


Figure 5: The influence of climatic conditions on Kompact spring barley variety in the Sistarovat area

Figure 5 shows that in the agricultural year 2008-2009, for Kompact spring barley variety the production recorded a low value of 2848 kg/ha, compared with

agricultural year 2009-2010 when it rose to 3034 kg/ha, being positively influenced by both precipitation and temperatures, which recorded values with a positive influence in the development of plants in the growth season, resulting a higher production.

### CONCLUSIONS

1. In the climate territory of Sistarovat highest productions were obtained in agricultural year 2009-2010 at the variety Kompact (3034 kg/ha), followed by Cristalia variety (2905 kg/ha) and Annabell (2903 kg/ha)
2. For both, agricultural year 2008-2009 and 2009-2010, were registered temperature and rainfall deviations, that influenced the production values, which are higher in the agricultural year 2009-2010, resulting a favorable year for barley crop, compared to agriculture 2008-2009, which was a year with normal precipitation and high temperatures during the growing season, resulting lower productions.

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