Original Article

# Climatic Influence upon the Action of Quarantine Pathogens on Tomato Cultures

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**Abstract**

Harmful pathogens immune actions need to establish protective measures against the introduction into the country of organisms harmful to plants or plant products, respectively orgnismelor quarantine and against their spread. The experiment was conducted in experimental 2010, under the test conditions of a tomato farm located in the County of Alba, commune Răhău respectively. In the experimental period, the dependence of the degree of attack of septoriosis in tomatoes and registered thermic and pluviometruc regime from the month of April up to September, representing a negative trend and a positive trend, respectively, but it does not respect linearity The value of the correlation coefficient between septoriosis attack and temperature is negative and moderate R = -0.442, representative for 19.50% of the analzyed culture, and correlation coefficient between septoriosis attack and rainfall is positive and moderate R = +0.488, representative for 23.80% of the analzyed culture.

**Keywords:**  correlation, rainfall, septoriosis, temperature.

## 1. Introduction

Harmful pathogens immune actions need to establish protective measures against the introduction into the country of organisms harmful to plants or plant products, respectively orgnismelor quarantine and against their spread. Protection of plants against such organisms is absolutely necessary not only to avoid reduced yields but also to increase productivity in agriculture [3]. Shares systematic eradication of harmful organisms in the country, established by the plant health regime would have only limited effect if not applied simultaneously with protective measures against their introduction in the country [1, 5, 6, 7].

High incidence of septoria tomatoes continues to be a source of threat, according to the Transylvanian Plain characterized by traditional agriculture (lack of large farms growing potatoes, avoid crop rotation, traditional treatments against diseases and pests etc.) and a changed climate regime [1, 2, 4]. The aim of our study ist o emphasize the influence of the climatic factors temperature and rainfall regimen on the action of septoriozis, in tomato culture, in climatic conditions of the County of Alba.

## 2. Material and Method

The experiment was conducted in experimental 2010, under the test conditions of a tomato tomato farm located in the County of Alba, commune Răhău respectively. The study was

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conducted under normal crop maintenance or maintenance culture, works of weed control by manual or mechanical hoeing, along with appropriate rebilonările and classical treatments targeted against pathogens. It was assessed the extent of the attack target pathogen or organism that causes septoria quarantine, according to the evolution of climatic factors, to determine the degree of attack changes produced under the influence of climate change developments. Data were statistically analyzed using STATISTICA software v.8.0.

## 3. Results and Discussions

Between the degree of attack of septoriosis and thermic regime registered during the period under study, ie from April to September of 2010 monitored experimental field located in Alba County

in Transylvania region there was an interrelation highlighted by calculating correlations between the two experimental factors mentioned.

Dependence of the thermal regime and the degree of attack of septoriosis in tomatoes for experimental year 2010 was tested taking into account average the entire period under study (6 months) and the entire experimental field, in order of adoption in a good way calculating correlations between parameters analyzed (Fig. 1).

Thus, in 2010 there was a distribution close to linearity at higher values of the attack, but a short 24-26% in the temperature range 19ºC – 21ºC, otherwise the distribution is nonlinear and could observe five distinct groups with two located at both ends of the regression line, indicating a positive variation of the two parameters analyzed (Fig. 1).
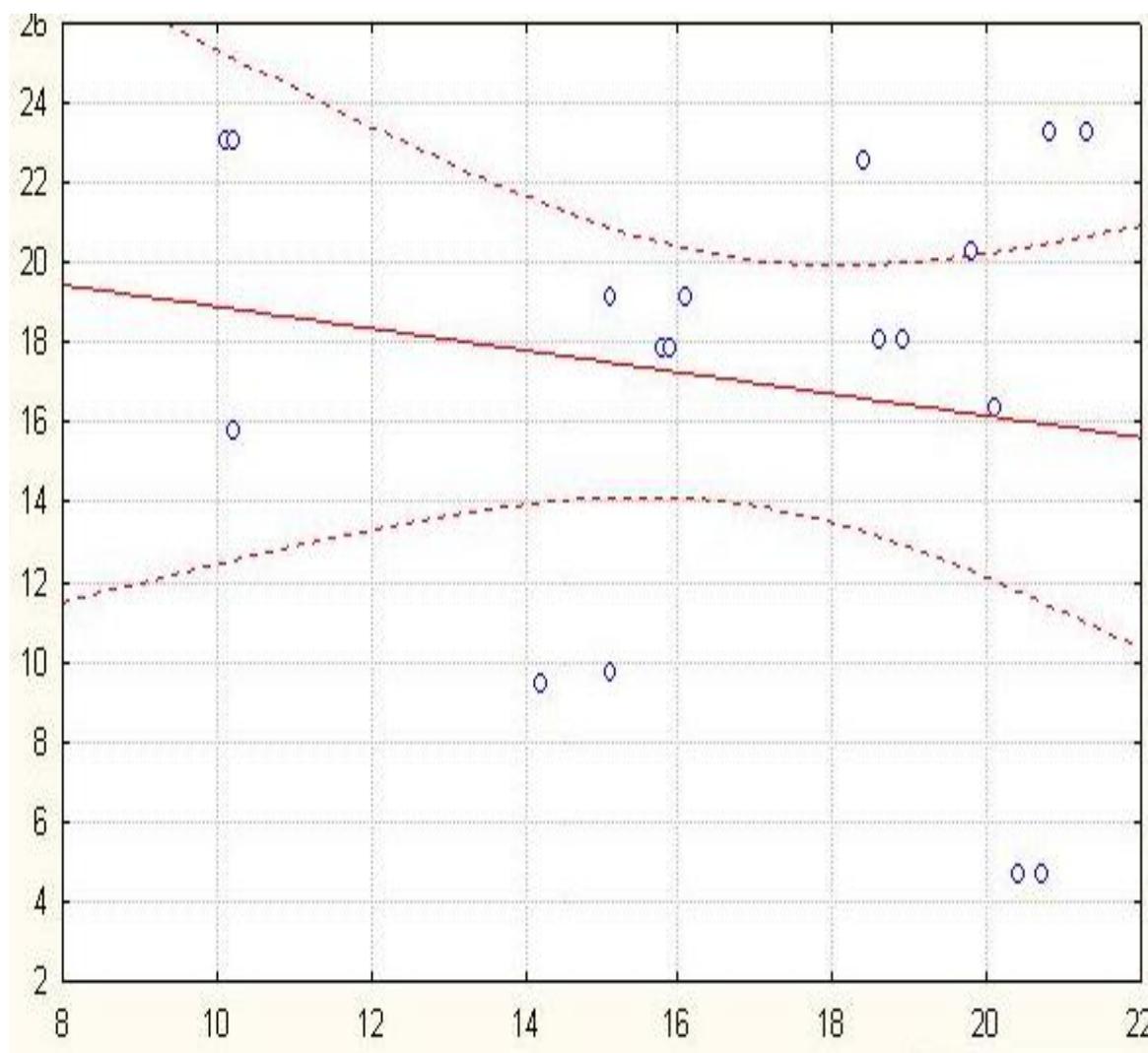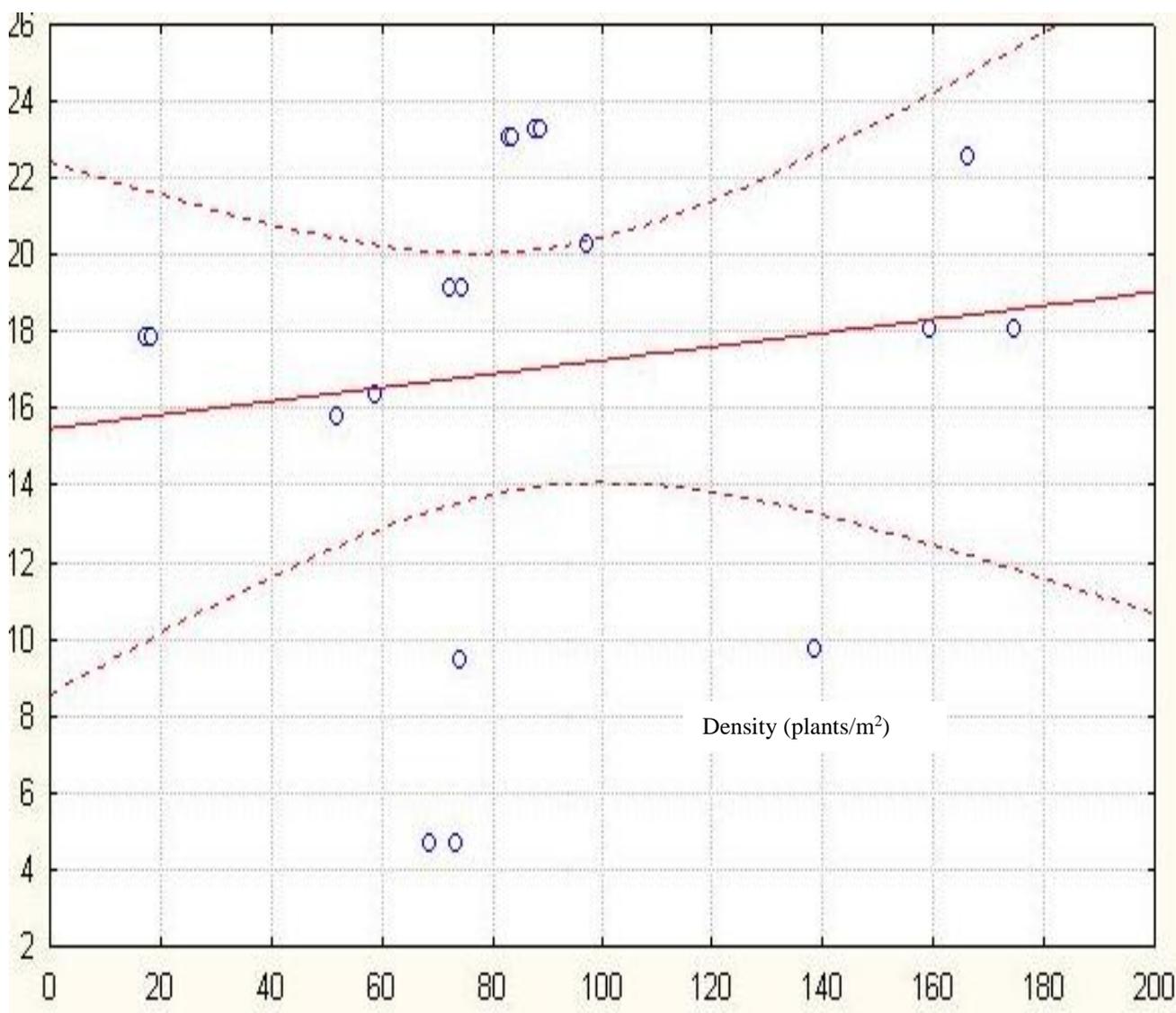


**Figure 1.** The evolution of the average attack degree of potato early blight pathogen agent *Alternaria solani* Sorauer function of the average temperature during experimental period April – September 2010

Analysis of dependence between the attack of septoriosis in tomatoes and thermic regimen has resulted in the lack of linearity in the interrelation between the two parameters analyzed. This led in this case, the option of not using parametric test commonly used for calculating the correlation coefficients and the adoption of non-parametric test solution.

They were calculated correlations between parameters mentioned above using the algorithm applied to the correlation coefficient of Spearman, opting for this solution because, although it is a large number of parameters to calculate the correlation coefficients, the direction the relationship is maintained consistently positive (Fig. 1).

In 2010, the dependence of the degree of attack of septoriosis in tomatoes and registered pluviometruc regime in the months from April to September, representing the experimental show a positive trend, but does not respect linearity (Fig. 2).

Most of the values are distributed randomly into three groups dispersed, two located in the middle and bottom of the regression line on both sides of it, the majority outside the confidence interval (95%) and a group located at the lower part with values falling in this case, almost exclusively outside the confidence interval set at 95% (Fig. 2).



**Figure 2.** The evolution of the average attack degree of potato late blight pathogen agent *Alternaria solani* Sorauer function of the average rainfall quantity during experimental period April – September 2010

Similar situation antrioare, which was tested linearity dependence of the degree of attack of Septoria and abiotic factors represented by temperature and in case of testing the interrelation between the degree of attack of Septoria tomatoes due to a lack of linearity throughout the experimental timul year 2010 in this study, it was decided that the best solution is to apply a non-parametric test by applying the algorithm for calculating the correlation coefficient of Spearman, because although it is a large number of parameters to calculate the correlation coefficients, relationship remained constant upward direction (Fig. 2).

In experimental 2010, correlations between the degree of attack of septoriosis in tomatoes and rainfall in experimental year 2010, calculated using the algorithm specific correlation coefficient of Spearman were average (Table 38), their values are slightly lower compared to previous experimental year and 2009 (Table 1).

Table 1. Correlations, coefficients of determination and their significance for the evolution of septoriosis attack degree function of the abiotic factors temperature, and rainfall in 2010, in monitored tomato cultures from the County of Alba

| Issue | $R_S$ | $R^2$ | t | p |
|---|---|---|---|---|
| Temperature, ºC | - 0.442 | 0.195 | - 0.985 | 0.381 |
| Rainfall regimen, mm | 0.488 | 0.238 | 0.077 | 0.941 |

The value of the correlation coefficient between septoriosis attack and temperature is negative and moderate R = -0.442, representative for 19.50% of the analzyed culture, and statistically not assures at significance threshold of 5% (Table 1). The value of the correlation coefficient between septoriosis attack and rainfall is positive and moderate R = +0.488, representative for 23.80% of the analzyed culture, and statistically not assures at significance threshold of 5% (Table 1).

## 4. Conclusions

In the experimental period, the dependence of the degree of attack of septoriosis in tomatoes and registered thermic and pluviometruc regime from the month of April up to September, representing a negative trend and a positive trend, respectively, but it does not respect linearity

The value of the correlation coefficient between septoriosis attack and temperature is negative and moderate R = -0.442, representative for 19.50% of the analzyed culture, and correlation coefficient between septoriosis attack and rainfall is positive and moderate R = +0.488, representative for 23.80% of the analzyed culture.

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