Physiological Responses of Chrysanthemum Varieties to \textit{Septoria chrysanthemella} Sacc. Attack

Rodi MITREA, Camelina STEFAN

University of Craiova, str. A.I. Cuza 13, cod. 20585, Romania
(e-mail rodimitrea@yahoo.com)

\textbf{Abstract}

The primary effect of a pathogen manifest at cell level, further can extend, observing metabolism modification of the entire plant, that can affect the normal development of the physiological processes, with direct or indirect consequence on the production quantity and quality.

The purpose of this paper has been to elucidate some aspects regarding the modification produced by the \textit{Septoria chrysanthemella} Sacc. fungus to the intensity of some physiological processes for some chrysanthemum varieties comparatively with the healthy plants.

\textbf{Key words:} chrysanthemum, \textit{Septoria chrysanthemella} Sacc.

\textbf{Introduction}

The chrysanthemum is one of the most important flowery plants introduce long ago in the flowery assortment competing with success a series of other flowery plants.

In Romania the chrysanthemum crops occupy large area in field as well in greenhouses. One of the diseases with economical importance that frequently attack the chrysanthemum crops is the black leaf spot disease produced by \textit{Septoria chrysanthemella} Sacc. The disease is very damaging because it causes the leaves drying, affect the plants development and growth, the fungus being favorized by high humidity.

\textbf{Material and method}

The study has been made on plants collected from the chrysanthemum crops of the Nicolae Romanescu Park, Craiova, Romania.

The research has been made on 4 chrysanthemum varieties with different behaviour at the attack of the \textit{Septoria chrysanthemella} Sacc. fungus.

For the analysis of the physiological processes, there has been used healthy and attacked leaves, same age, collected from the same part of the plant, belonging to the studied varieties.

Within each variety there has been recorded the differences between the healthy and attacked leaves, as well the differences between the healthy leaves from the varieties that behave different at the attack of the pathogen.

In order to determine the physiological index there has been used the following laboratory methods:

the determination of the apparent photosynthesis has been made by the method T. Z. Baradulina, L.G. Kolosaena, the results has been expressed in CO$_2$ mg/100 g plant material;

the respiration intensity has been made by the Boysen-Jensen method, expressed in CO$_2$ mg/kg plant material/h;

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the transpiration intensity has been determined through the L. A. Ivanoy method and has been expressed in g H₂O/dm²/h;

the determination of the assimilatory pigments has been made through extraction with acetone and has been expressed in mg/dm² or mg/100g plant material.

**Results and discussion**

Regarding the apparent photosynthesis expressed in CO₂ mg/100 g plant material, as it can be observed in the fig. 1 first of all there has been recorded differences between the values of the samples collected from healthy plants of the 5 chrysanthemum varieties.

At a first analyze we noticed that in the attacked leaves collected from the studied varieties there has been decreasing of the apparent photosynthesis comparative with the values recorded for the healthy leaves.

The most pronounced decrease with a value of 12.4 mg/CO₂/100g vegetal material between the sample with the healthy leaves and the sample with the attacked leaves has been recorded at the Margareta variety with white flowers, variety that presented an average value of the attack degree of 7.5%, value that is inferior to the values recorded for the Anemone variety with white flowers (9.4%) or even for the Margareta variety with orange flowers (7.9%).

The decrease of the photosynthesis in the samples with attacked leaves comparative with the ones with healthy leaves, due to the decrease of the assimilation area as results of the attacked tissues necrosis and even to the chlorosis of the attacked leaves that often drying.

Analyzing the data from the fig. 2, it can be observed that regarding the intensity of the respiration expressed in mg/CO₂/kg plant material/h, this increase in the sample with the attacked leaves comparative with the samples with healthy leaves, for each variety.

The highest value for respiration intensity has been recorded at the leaves with diseases symptoms from the Pompon variety with brownish flowers, as well with yellow flowers. The differences between the respiration intensity in the samples with attacked and healthy leaves had values of 89.7% and 89.4% mg CO₂/kg fresh mater, respectively.

The fact that all the varieties where has been recorded the highest average values of the attack degree, during the research period, doesn’t present the highest differences between the healthy and attacked leaves, we can explain it by the more accented exhaustion at this varieties of the vegetal tissues.

Regarding the intensity of the transpiration expressed in g H₂O/fresh mater/h it come out at a first analyze that this one increase in the sample with the attacked leaves comparatively with the samples with healthy leaves for each variety indepent by the colour of the flower (fig. 3).

The increase of the transpiration in the attacked leaves compared with the healthy leaves can be explain through the alteration of the cell membrane permeability under the action of the pathogen toxins.

Parallel with the study of the modification produced by the *Septoria chrysanthemella* Sacc. fungus in the intensity of the physiological processes, there has been made the study of the chlorophyll pigments present in the leaves of the different chrysanthemum varieties, specially the “a” chlorophyll, the “b” chlorophyll and carotene, which has been expressed in mg/dm² of fresh leaf.

There has been made comparative determination for each varie ty in the samples with healthy leaves as well in the samples with attacked leaves, it come out that in the attacked leaves the contain in chlorophylls and carotene is lower.

Summing the chlorophyll pigments we noticed that the values recorded for the healthy leaves has been ranged between the limits of 59.2 mg/dm² at the Pompon variety with yellow flowers and 48.40 mg/dm² at the Margareta variety with orange flowers.

In the case of the samples with attacked leaves the highest content of chlorophyll pigments of 42.99 kg/dm², has been recorded at the Turner variety with purple flower, and the lowest value of 15.48 mg/dm² at the Spider variety with purple flower.

Analyzing all these data and correlated with the calculated degree attack, we can ascertain that this one is not influenced neither positively nor negatively by the content of chlorophyll pigments, and there are probably other factors of nature that intervene in the different behaviour of the chrysanthemum varieties at the attack of the *Septoria chrysanthemella* Sacc.
Effect of Cultivar and Thinning on Growth of Poinsettia

Conclusions

The fungus *Septoria chrysanthemella* Sacc. which produce the black leaf spot disease determine modification to the physiological processes intensity in the attacked tissues comparatively with the healthy ones function the chrysanthemum variety.

The apparently photosynthesis express in mg CO₂/100 g fresh mater, decrease in the leaves with disease symptoms, and even within the same variety of chrysanthemum has been recorded different values of the photosynthesis intensity.

The intensity of the respiration expressed in mg CO₂/kg fresh mater/h, increase in the tissues attacked by *Septoria chrysanthemella* Sacc., the highest value has been recorded at the Pompon variety with brick-coloured.

The intensity of the transpiration expressed in g H₂O/fresh mater/h, increase in the leaves attacked by the fungus *Septoria chrysanthemella* Sacc. comparative with healthy leaves at each variety of chrysanthemum, indifferent the colour of the flowers, as a result of the cell membrane alteration under the action of the pathogen toxins.
The different behaviour of the chrysanthemum varieties at the attack of *Septoria chrysanthemella* Sacc., is not influenced neither positive nor negative by the content of chlorophyll pigments.

References

