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RESEARCH REGARDING THE INFLUENCE OF TEMPERATURE, ATMOSPHERIC HUMIDITY AND LIGHT UPON THE BIOLOGY OF THE *STIGMINA CARPOPHILA* FUNGUS

C. VĂCĂROIU, C.R. ZALĂ, STELICA CRISTEA, MARIA OPREA

University of Agronomic Sciences and Veterinary Medicine of Bucharest

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Abstract

The Stigmina carpophila (Lev.) B. Ellis (sin. Cotyneum beijerinckii Ouedem, Clasterosporium carpoplilum (Lev.) Adelhold), teleomorf a Ascospora beijerincki Vuill., fungus produces diseases to the plant's leaves and stains the fruit of the pits, which attack with different intensities the peach, the apricot, the sour cherry tree, the cherry and the plum.

Depreciating quality of the fruit are the first symptoms of the disease, then, through the growth of the attack degree, early defoliation appears, which leads to the trees' weakness and in the end to their decline.

In Romania, this fungus is quite outspread, being very common in less attended meadows, if they are not protected from this fungus. This pest causes great losses in the years with favorable weather conditions.

An important aspect is researching the biological parameters of this fungus.

The biological material used was typified by the leafs, shoots, fruit, flowers and buds of the kernel species.

The pathogen's isolation was made on a crop area formed of potato-corn syrup -agarCGA).

INTRODUCTION

In our country's weather conditions the fungus survives each year in burgeons, in the bark's holes and in wounds, which makes infections appear easier in early spring, immediately after the temperature exceeds 2°C, and the atmospherical humidity is high, over 80%, very close to saturation.

Infections are strong in April-June, when frequent rains are recorded. During summer, when temperature exceeds 30°C, the fungus is inactive, and the infections stop. In autumn, after temperature decrease and beginning of rains, new infections of the branches appear, which last also in winter if temperatures do not drop below 2°C. Therefore, the critical time of burgeons and branches infections is autumn until the beginning of winter and also in spring, when trees start to form leaves.

MATERIAL AND METHODS

The main abiotic factors which influence the fungus's development were established in laboratory conditions, closely following the Tuite method (1968).

Temperature

Stigmina carpophila fungus was moved on CGA environment, in Petri pots, with an 8 cm diameter and then put in thermostat, at 2 – 40°C temperatures. Each 3 days, we observed an increase in their diameter of the colonies. Our observations subsisted 15 days.

In order to study the temperature's influence upon the *Stigmina carpophila* fungus, the Petri pots were held for 24 hours and at a 2 hours interval the *Stigmina carpophila* fungus's germination was examined, for each and every variant.

The air's relative humidity

In the exicators different humidity values were created, from 15% up to 100%, using overstrengthened solutions of some salts (tables 1 and 2).

The Petri pots, with CGA environment, in which the fungus was moved, were inserted in the exicator and held for 21 days without the Petri's top. The colonies' diameter was jotted down and the fructifications formation was closely studied.

The light acted differently upon the *Stigmina carpophila* fungus's colonies development, as a result of the crop's constant exposure to permanent light, permanent darkness and also light/darkenss alternation 8/16 or 12/12. The final observations were made after 15 days, when the increase and fructification of the fungus was estimated and assessed.

RESULTS AND DISCUSSION

Temperature

The increase and the fructification of the *Stigmina carpophila* fungus colonies are influenced by the termical values.

The minimum temperature for the colonies to be formed was 2ºC, under the shape of a flexible body, of light brown color, and the obverse yellowish; the fructifications were absent. The aspect was maintained the same despite 4ºC temperatures, and 6ºC temperatures. The 8ºC temperature induces a better growth and development of the colonies, so that the body is compact, with a silky aspect, of a yellowish-brown color, with a light brown obverse; the reproductive organs' presence was noted, which are very rare at the body's surface. At 12ºC and 14ºC the colonies showed the same characteristics, but from 16ºC and higher, the colonies formed a vegetative mass, multiplying very well.

The optimal temperature necessary for the colonies to grow and develop is between 20ºC and 24ºC, when a 50 mm diameter of the colonies was registered, with a

silky, thick, dense, brown color aspect, and with a light brown obverse. The fructification was very good; the number of the reproductive organs was big.

Over 24ºC the colonies' development was weaker, likewise the number of the reproductive organs formed.

The maximum temperature threshold can be accounted at 32ºC. The colonies formed have a frail aspect, and the fructifications weren't formed anymore.

Regarding the temperature's influence upon the reproductive organs (figure 1), studies showed that this is possible starting with a 2ºC, temperature, 16 hours being absolutely necessary, this temperature being the minimum threshold.

After 8 hours, at 10-24ºC temperatures, the reproduction organs' germination was of 20-25%, and after 24 hours it was of 53-85%.

The optimal temperature can be considered between 20-26ºC.

The maximum temperature was noted to be of 32ºC.

The lethal temperature was identified to be 34ºC.

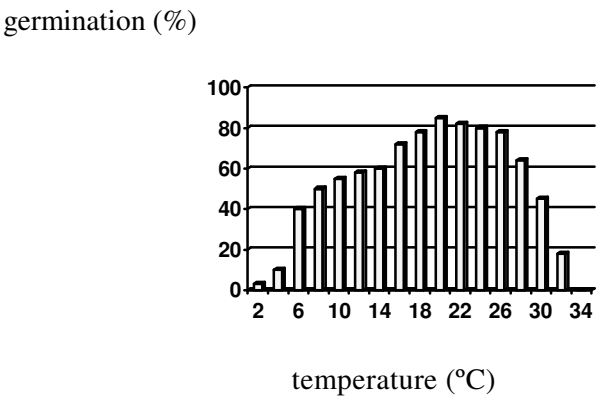

Fig. 1. Reproductive organs' germination depending on temperature

Relative atmospheric humidity represents an important factor in the fungus's evolution.

Table 3 we can see that at 15% values the colonies did not develop.

At atmospheric humidity of over 36.8%, the formed body was flexible, and the reproductive organs were not formed. At 66-72% values, the formed colonies had a tough and callous aspect, of light brown color with white edges, and the fructifications were not formed. From over 75.6% values, the reproductive organs formation was pointed out; they developed at the colonies' surface. The higher the value of the relative atmospherical humidity is, the better the colonies development

is, and the vegetative mass is dense, thick, of brown color, and the fructifications are sometimes abundant.

Table 1

Attaining some values of relative atmospherical humidity in controlled areas

Satiated solution of salts	Atmospheric relative humidity achieved (%)
Lithium chloride	15
Calcium chloride	35
$Mg\ (C_2\ H_3 0_2)_2 .H_2 0$	65
Ammonium sulphate	81
Sodium phosphate acid $Na_2 HP0_4 . 2H_2 0$	95

Table 2

Attaining some values of relative atmospherically humidity in controlled areas under sodium chloride's influence

Satiated solution of sodium chloride	Atmospheric relative humidity achieved (%)
5.2 mol = 0304 gr sodium chloride	76
4.5 mol = 262 gr sodium chloride	80
3.6 mol = 210 gr sodium chloride	85
2.5 mol = 147 gr sodium chloride	90
1.5 mol = 88 gr sodium chloride	95
0.75mol = 44 gr sodium chloride	98
0.3 mol = 17.5 gr sodium chloride	99
0.1 mol = 6.0 gr sodium chloride	100

Table 3

Atmospheric relative humidity's influence upon the colonies' development

Atmosphérique relative humidité RH (%)	The colonies' diameter after 12 days	Observations
15	0	Colonies are not formed
36.8	20	Weak growth
43	32	Mv ±; Fr 0
56	37	Mv ±; Fr 0
66	50	Mv ++; Fr 0

72	50	Mv ++; Fr 0
75.6	50	Mv ++; Fr +
78.6	50	Mv +++; Fr ++
82.9	50	Mv +++; Fr +++
88.5	50	Mv +++; Fr +++
90	50	Mv +++; Fr +++
92.7	50	Mv +++; Fr +++
96.1	50	Mv +++; Fr +++
98.5	50	Mv +++; Fr +++
99	50	Mv +++; Fr +++

Mv ± - very weak vegetative mass
Mv + - weak vegetative mass
Mv ++ - good vegetative mass
Mv +++ - very good vegetative mass
Fr 0 - the fungus did not fructify
Fr + -weak fructification
Fr ++ - good fructification
Fr +++ - abundant fructification

Regarding light, the *Stigmina carpophila* fungus's colonies developed well in its presence, as it can be seen in table 4.

In permanent light or alternating light, the vegetative mass of the formed colonies was rich, the body was tough, of brown colour, and the multiplication was abundent.

Permanent darkness, throughout the whole experiment, led to colonies formation, but with a very weak vegetative mass, and the reproductive organs rarely appeared at the body's surface.

Table 4

Light's influence upon the fungus's growth

Light	Colonies development
Light 24 hours	Rich vegetative mass, tough body, of brown colour, good multiplication
Light/darkness alternation 12/12 hours	
Light/darkness alternation 8/16 hours	
Permanent darkness	Very weak vegetative mass, sporadical fructifications

CONCLUSIONS

1. The growth and fructification of the *Stigmina carpophila* fungus's colonies are influenced by the termic values, relative atmospherical humidity and light.
2. The minimum temperature of colonies formation was of 2ºC, the optimal temperature can be considered to be between 20-26ºC, and the maximum is 32ºC, and the lethal temperature was identified to be 34ºC.
3. At atmospherical humidity between 36.8% and 72%, the reproductive organs are not formed. At over 75.6% values, formation of the reproductive organs was noted, and, as the relative atmospherical humidity values grow, the colonies' development is better.
4. Concerning light, the *Stigmina carpophila* fungus's colonies grew very well in its presence; permanent darkness determines colonies formation which have a very weak vegetative mass and very few reproductive organs at the body's surface.

REFERENCES

1. Gheorgieş C., I. Geamăn, 2003. *Bolile plantelor horticole*. Ed. Universitas Co. Bucureşti.
2. Rafailă C., Maria Oprea, 1981. *Contribuţii la cunoaşterea cauzelor care determină declinul caisului.* A VII-a Conferinţă de Protecţia Plantelor, Cluj.