

**DYNAMIC BLADE COMPONENTS REGISTERED ON SOYBEAN
PLANTS FOLLOWING TREATMENTS APPLIED TO SOIL AND PLANT,
IN RELATION TO RESISTANCE TO ATTACK OF THE FUNGUS
*BOTRYTIS CINEREA***

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Abstract

Soybean plants, belonging to the PR line (Botrytis sensible), grown in fields and greenhouse, were subjected to treatments with fungicides and elicitors, applied on soil or plants, to test their behavior to the attack of the fungus Botrytis cinerea. Plants of each variant showed a different reaction in relation with the control variants. At the blade level, changes have been observed in the size of mesophyll and epidermal cells, and in the number of stomata encountered on the upper epidermis.

INTRODUCTION

The paper work includes research performed on leaves belonging to soybean plants to reveal changes occurring in the leaf structure, following the application of treatments to boost resistance to the fungus Botrytis; the research, conducted during 2009, continue the research carried out in 2008 whose results were published previously [1].

MATERIAL AND METHODS

The plant material was consisted of leaves drawing from one line of soybean plants – M10 (*Botrytis sensible*), on which were applied these treatments:

- contact fungicides – Captan+Teldor, Captan+Batron (fine sprayings on plants);
- systemic fungicides – Topsin M+Rovral, Topsin M (introduced in soil);
- 4 extracts types – 1, 2, 3 (applied on leaves or on soil);
- pathogen inoculation – *Botrytis* (applied on leaves or on soil).

Variants are made of plants grown in the greenhouse and in the field.

For the microscopic observations and measurements there were made cross sections in the middle blade zones or in parts of leaf with pathogen attack symptoms. These were stained by alauin-carmin and jod-grun for study with a light microscope (BA 2500 with phase contrast); photos were taken with a digital camera (Panasonic DMC-LZ7).

RESULTS AND DISCUSSION

The results presented the anatomical measurements made at epidermis and mesophyll levels and the number of stomata located on the upper epidermis (Figure 1).

Comparing the results of biometric measurements made at mesophyll level for the chemical treatment and extracts 1, 3 variants (plant treatments; field crops, after treatments), with those obtained for control variant, it appears the same size, higher than the control variant, for the chemical treatment and for the extract 1 and a decrease in size for the extract 3 (Table 1).

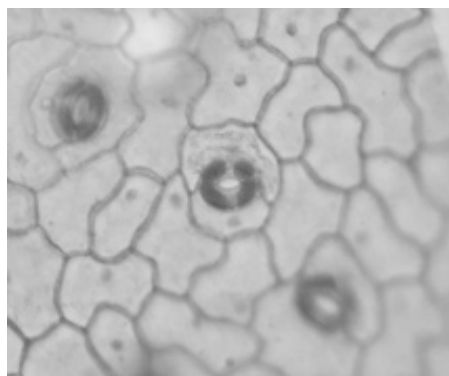


Fig. 1. Stomata on the upper epidermis

When treatments were applied on the soil, mesophyll sizes have been increased from those of the control variant unless chemical treatments, while for both types of extracts, mesophyll sizes were smaller than those of the control variant (Table 1).

Number of stoma formed on each leaf is dependent on abiotic factors such as light or carbon dioxide [2, 3]. Regarding the stomata numbers formed on the upper epidermis, the treatment variants, regardless of their mode of application (on the soil or on the plant) show a lower level than that observed in control variant (Table 1).

The same treatments on plants grown in greenhouse have led to different results on the mesophyll sizes: there are higher than that of the control variant for chemical treatments on soil, extract 1 on plants and soil, and extract 3 on plants variants (Table 2). The mesophyll sizes are reduced to the control variant for the following variants: chemical treatments on plants, extract 2 on plants and soil, extract 3 on soil (Table 2). The stomata number is reduced for all variants compared with the control variant (Table 2).

Table 1

Results of biometric measurements made in soybean leaves - M10 (field crops; after treatments)

Variants	Blade biometric measurements (μ)			Stomata number/100 μ^2
	Upper epidermis	Mesophyll	Lower epidermis	
Control	17.60	196.00	14.40	40
Chemical treatments on plants	16.80	211.20	17.60	32
Chemical treatments on soil	14.00	217.60	16.00	24
Extract 1 on plants	16.80	211.20	17.60	28
Extract 1 on soil	18.40	188.80	16.00	24
Extract 3 on plants	14.40	189.60	16.00	20
Extract 3 on soil	16.80	132.80	17.60	20

Table 2

Results of biometric measurements made in soybean leaves - M10 (greenhouse crops; after treatments)

Variants	Blade biometric measurements (μ)			Stomata number/100 μ^2
	Upper epidermis	Mesophyll	Lower epidermis	
Control	15.20	150.40	16.80	36
Chemical treatments on plants	16.80	139.20	16.00	20
Chemical treatments on soil	16.00	178.40	16.80	24
Extract 1 on plants	18.40	179.20	18.40	16
Extract 1 on soil	16.80	152.00	16.00	28
Extract 2 on plants	19.20	133.60	16.30	16
Extract 2 on soil	18.40	148.80	15.20	20
Extract 3 on plants	15.20	156.80	16.80	28
Extract 3 on soil	18.40	132.80	17.60	20

After pathogen inoculation in all variants applied on field crops, there was a decrease in size of the mesophyll to the control variant (Table 3). Again, the stomata number is reduced for all variants compared with the control variant (Table 3).

Table 3**Results of biometric measurements made in soybean leaves - M10 (field crops; after pathogen inoculation)**

Variants	Blade biometric measurements (μ)			Stomata number/100 μ^2
	Upper epidermis	Mesophyll	Lower epidermis	
Control	16.00	228.00	15.20	32
Chemical treatments on plants	14.40	171.20	16.00	24
Chemical treatments on soil	14.40	171.20	16.00	28
Extract 1 on plants	12.80	182,40	16.00	28
Extract 1 on soil	15.20	133.60	13.60	16
Extract 3 on plants	12.00	171.20	12.00	32
Extract 3 on soil	15,60	211.00	18.40	28

The results from biometric measurements from greenhouse crop show an increase in size of the mesophyll for all the variants except the chemical treatments on soil variant (Table 4).

In terms of stomata number, it varies; for the first time appear stomata equals or higher in numbers than those recorded in controls, respectively chemical treatments on plant, extract 1 on plants, extract 2 on plants and on soil, extract 3 on soil variants (Table 4).

Table 4**Results of biometric measurements made in soybean leaves - M10 (greenhouse crops; after pathogen inoculation)**

Variants	Blade biometric measurements (μ)			Stomata number/100 μ^2
	Upper epidermis	Mesophyll	Lower epidermis	
Control	14,40	91,20	13,60	20
Chemical treatments on plants	14,40	163,20	16,00	24
Chemical treatments on soil	15,00	80,00	14,00	12
Extract 1 on plants	14,40	120,00	16,00	32
Extract 1 on soil	15,20	133,60	13,60	16
Extract 2 on plants	18,00	133,60	16,00	20
Extract 2 on soil	14,40	162,40	16,00	24
Extract 3 on plants	14,40	117,60	16,00	12
Extract 3 on soil	15,20	130,40	15,20	20

CONCLUSIONS

1. The treatments led by spraying plants usually increase the mesophyll in size compared with the control variant.
2. The number of stoma formed on the upper epidermis remained lower than the control variant, in all treatment options, except the variants of greenhouse crops, after the pathogen inoculation.

REFERENCES

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