

**"IN VITRO" ACTION OF SOME TOTAL PLANT EXTRACTS ON
THE GERMINATION AND GROWTH OF *CONIOTHYRIUM
CONCENTRICUM* FUNGUS**

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Abstract: In our experiments, we tested "in vitro" action of some plant extracts (*Berberis vulgaris*, *Chelidonium majus*, *Solanum nigrum*), on the germination and growth of *Coniothyrium concentricum* fungus, isolated from *Yucca filamentosa*.

Plant extract from *Berberis vulgaris* (250 µg/ml nutritive medium) had fungicide effect on the studied species. The same effect also had plant extract from *Chelidonium majus* (250 µg/ml nutritive medium). Plant extract from *Solanum nigrum* (250 µg/ml) had a less powerful inhibitory effect on *Coniothyrium concentricum* fungus.

Plant extract's effect, on the studied species, is determined by the chemical composition and its concentration in the nutritive medium.

Introduction

Coniothyrium genus (ord. Sphaeropsidales) has many pathogen species, such as: *Coniothyrium opuntiae*, *C. olivaceum*, *C. hellebori*, *C. berberidis*, *C. concentricum* etc. [11].

Coniothyrium concentricum fungus attacks, more frequently, *Yucca* species (*Yucca filamentosa*, *Y. gloriosa*, *Y. brevifolia*, *Y. aloifolia*, *Y. baccata* etc.).

Fungus' sporulation is made up of picnidia with ovoid picnospores (5-10 × 3-6 µm) [11].

There are used different methods (chemical, biological), for controlling *Coniothyrium concentricum* parasite fungus. Biological methods (hiperparasitism, microbial antagonism, antibiotics, plant extracts) are very important.

There is evidence that some plant extracts have antimicrobial activity. Thus, "in vitro" activity of the plant extracts from *Chelidonium majus* and *Pastinaca sativa* inhibited 90 % the development of *Botrytis cinerea*'s colony, isolated from vine [5]. Plant extracts from *Petroselinum hortense* and *P. sativa* completely inhibited the growth of *Botrytis cinerea* fungus, isolated from *Lycopersicum esculentum* and *Cinnamomum* spp. [6]. The total plant extracts from *Berberis vulgaris* and *Chelidonium majus* have antibiotal activity on many pathogens.

Active substances of these plants are represented by alkaloids berberin, and, respectively, chelidonin [2,4].

Material and method

In our experiments, we studied the action of some total plant extracts from *Berberis vulgaris*, *Solanum nigrum* and *Chelidonium majus*, on “in vitro” germination and growth of *Coniothyrium concentricum* fungus.

Plant extract from *Berberis vulgaris* contains 1% alkaloids appreciated in berberin. Plant extract from *Chelidonium majus* contains 0,25% alkaloids (appreciated in chelidonin), and the one from *Solanum nigrum* has 1% alkaloids (appreciated in solanin).

There were done many experimental variants, for each plant extract we tested. Each variant corresponds to one concentration of the plant extract. Six repetitions were done for each experimental variant.

In our experiments, the total plant extracts were used without ethylic alcohol.

Plant extract was added to the sterilized nutritive medium (Czapek-agar), which was then distributed in Petri plates (70 mm in diameter). Petri plates were inoculated with *Coniothyrium concentricum*'s spores, in central point.

There were done observations on the germination and growth of *Coniothyrium concentricum* fungus, after an incubation at 22° C, at regular times (3, 6, 9 and 12 days).

“In vitro” action of the plant extracts, on the studied species, was compared to the control (without plant extract).

Experimental results were represented in figures 1, 2 and 3.

Results and discussion

For testing “in vitro” action of the plant extract from *Berberis vulgaris* on *Coniothyrium concentricum* fungus, many concentrations (100 µg/ml; 150 µg/ml; 200 µg/ml; 250 µg/ml) were done.

Plant extract from *Berberis vulgaris* contains many active substances. We mention alkaloids, such as: berberin, berbamin, berberubin, oxyacanthin, magnoflorin, which are present especially in root's bark and leaves [12].

The ripe fruits of *Berberis vulgaris* don't contain alkaloids; they contain glucose, fructose, gums and C vitamin [1].

Beside alkaloids, *Berberis vulgaris*' bark also contains chelidonic acid, tanins, resins, etc.

Alkaloids from *Berberis vulgaris* cause digestive, nervous, hepatic troubles.

Recent studies showed that berberin has bacteriostatic action, especially against Koch bacillus [2].

Colony diameter
 (mm)

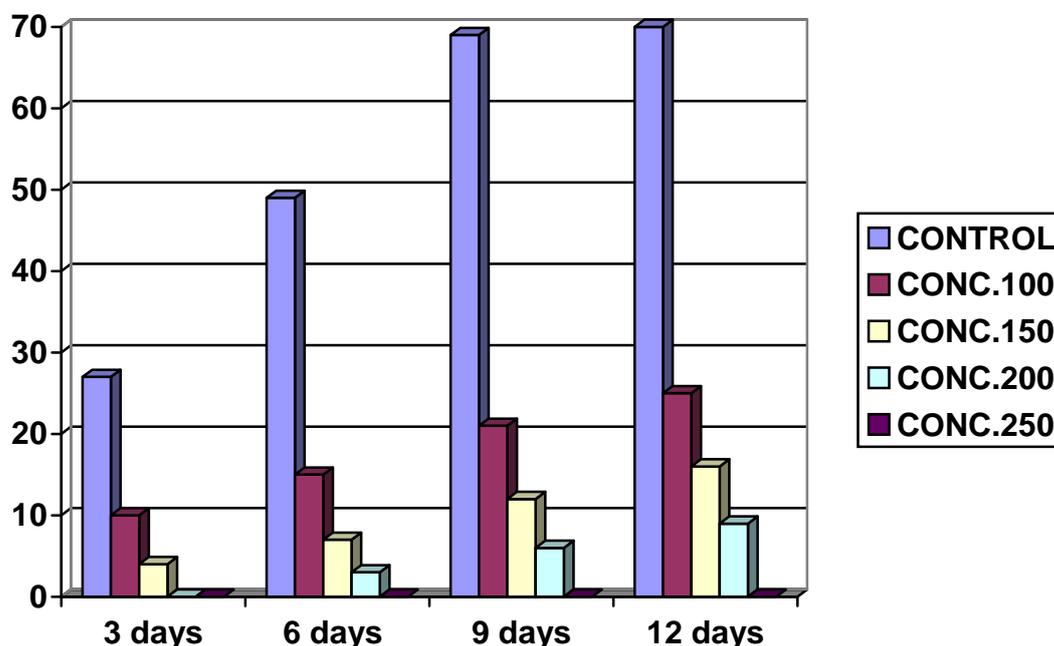


Fig. 1: “In vitro” action of the total plant extract from *Berberis vulgaris* on the germination and growth of *Coniothyrium concentricum* species.

It can be observed that the total plant extract from *Berberis vulgaris* has an inhibitory effect on the development of *Coniothyrium concentricum*'s colony, at a concentration of 100 µg/ml nutritive medium. At this concentration, the colony diameter is about 25 mm, after 12 days of incubation. The inhibitory effect of the total plant extract from *Berberis vulgaris* is proportional to its concentration in the nutritive medium. Thus, at a concentration of 150 µg/ml nutritive medium, the diameter of *Coniothyrium concentricum*'s colony is not more than 16 mm. The total plant extract from *Berberis vulgaris* (250 µg/ml nutritive medium) has an obvious fungicide effect; after 12 days of incubation, fungus doesn't germinate.

The total inhibition of the germination and growth of the pathogen fungus was achieved at a concentration of 250 µg/ml (Fig. 1).

The total plant extract from *Berberis vulgaris* has a fungicide effect on the growth and development of *Coniothyrium concentricum* fungus.

We also tested the activity of the total plant extract from *Chelidonium majus*, on the studied pathogen fungus. To achieve this, there were made many concentrations: 100 µg/ml, 150 µg/ml, 200 µg/ml, 250 µg/ml nutritive medium (Fig. 2).

Chelidonium majus species contains different alkaloids, such as: chelidonin, homochelidonin, oxychelidonin, metoxychelidonin, sanguinarin, berberin, etc. [12].

Beside alkaloids, it also contains chelidonic acid, resins, volatile oil. Alkaloids are mostly present in latex. There were identified great amounts of C vitamin in leaves [2].

Alkaloids isolated from *Chelidonium majus* were tested for their fungitoxic activity [7].

Methanolic extract from *Chelidonium majus*, also had considerable inhibitory activity on the species of *Fusarium* genus [8].

Alkaloids' activity from *Chelidonium majus* was tested on some pathogen bacteria, such as: *Staphylococcus*, *Streptococcus*, *Escherichia*, *Pseudomonas* and on *Candida* fungus [4].

“In vitro” action of the total plant extracts from *Chelidonium majus* and *Berberis vulgaris* was also tested on pathogen species like *Botrytis cinerea*, isolated from *Dahlia pinnata* and *Sclerotium tuliparum*, isolated from *Tulipa gesneriana*. Plant extracts' fungicide activity on these fungi was obvious at a concentration of 250 $\mu\text{g/ml}$ nutritive medium [9].

Plant extract from *Chelidonium majus* has an inhibitory effect at a concentration of 100 $\mu\text{g/ml}$ nutritive medium (Fig. 2).

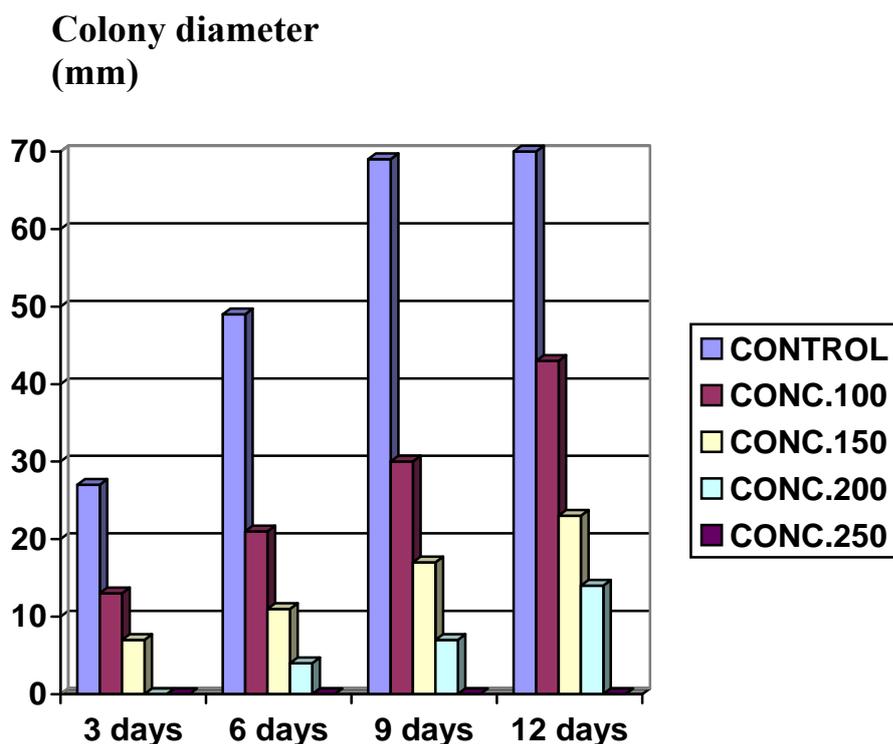


Fig. 2: “In vitro” action of the total plant extract from *Chelidonium majus* on the germination and growth of *Coniothyrium concentricum* species

Plant extract has a fungicide effect in experimental variants with 150 µg/ml and 200 µg/ml.

The total inhibitory effect of the plant extract proved to be at a concentration of 250 µg/ml nutritive medium. On such a medium, fungus' colony didn't appear.

The inhibitory effect of the plant extract is proportional to its concentration in the nutritive medium.

In our experiments, we also tested "in vitro" activity of the total plant extract from *Solanum nigrum* on the growth and development of *Coniothyrium concentricum* species.

Plant extract's activity was tested by obtaining many concentrations: 100 µg/ml; 150 µg/ml; 200 µg/ml; 250 µg/ml (Fig. 3).

Solanum nigrum species is toxic because it contains solanin. The highest toxicity have the unripe fruits and plants grown in sunny places (12).

Beside solanin, it also contains: solasonin, solamargin, solasodamin, chloragenic acid, sugars, fats, C vitamin.

Beside alkaloids, there are great amounts of saponins especially present in fruits; they have an antimicrobial activity [3].

The total plant extracts' effect from *Berberis vulgaris*, *Chelidonium majus* and *Solanum nigrum* was tested on *Botrytis aclada* species, isolated from *Allium cepa*. Plant extracts from *Berberis vulgaris* and *Chelidonium majus* had a total fungicide effect at a concentration of 250 µg/ml nutritive medium.

Colony diameter (mm)

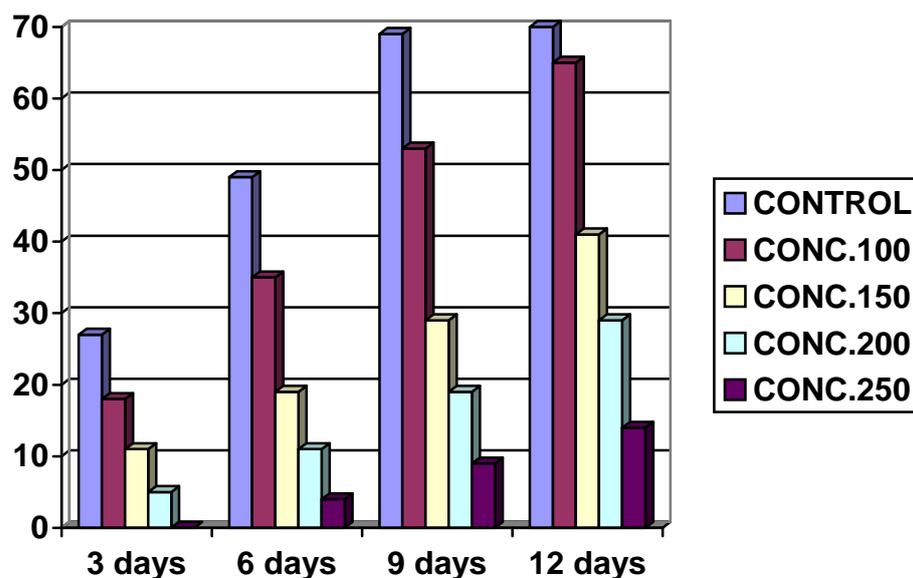


Fig. 3: "In vitro" action of plant extract from *Solanum nigrum* on the germination and growth of *Coniothyrium concentricum* pathogen fungus

The total plant extract from *Solanum nigrum* had an inhibitory effect on *Botrytis aclada* species. Plant extracts' inhibitory activity depended on the type of the extract and its concentration in the nutritive medium [10].

It can be seen that plant extract from *Solanum nigrum* has a less powerful inhibitory effect on *Coniothyrium concentricum* pathogen fungus, at concentrations of 100 µg/ml and 150 µg/ml.

Plant extract from *Solanum nigrum* (200 µg/ml and 250 µg/ml) had an inhibitory effect on the studied fungus (Fig. 3).

Unlike plant extracts from *Berberis vulgaris* and *Chelidonium majus*, plant extract from *Solanum nigrum* (250 µg/ml) didn't have a total inhibitory effect on the development of *Coniothyrium concentricum* fungus.

Conclusions

According to the experimental results, some conclusions can be drawn:

- *Coniothyrium* genus has many pathogen species (*Coniothyrium concentricum*, *Coniothyrium opuntiae*, *Coniothyrium olivaceum*, *Coniothyrium hellebori*, *Coniothyrium berberidis* etc.).

- Plant extract from *Berberis vulgaris* (250 µg/ml nutritive medium) had a total inhibitory effect on the germination and growth of *Coniothyrium concentricum* pathogen species.

- Plant extract from *Chelidonium majus* (250 µg/ml) had the same inhibitory effect.

- Plant extract from *Solanum nigrum* had a less powerful inhibitory effect on *Coniothyrium concentricum* species.

- "In vitro" effect of plant extract on *Coniothyrium concentricum* fungus depends on its composition and concentration in the nutritive medium.

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ACȚIUNEA "IN VITRO" A UNOR EXTRACTE VEGETALE TOTALE ASUPRA GERMINĂRII ȘI CREȘTERII CIUPERCII *CONIOTHYRIUM CONCENTRICUM*

(Rezumat)

Genul *Coniothyrium* cuprinde numeroase specii fitopatogene, precum *Coniothyrium concentricum*, *C. olivaceum*, *C. hellebori* etc. Specia *Coniothyrium concentricum* atacă cel mai frecvent plantele de *Yucca filamentosa* la care produce boala denumită pătarea frunzelor. Sporulația ciupercii este reprezentată de picnidii cu picnospori ovoizi ($5-10 \times 3-6 \mu\text{m}$). În cercetările realizate, s-a studiat efectul "in vitro" al unor extracte vegetale totale (*Berberis vulgaris*, *Chelidonium majus*, *Solanum nigrum*) asupra germinării și creșterii ciupercii fitopatogene. Pentru fiecare extract vegetal testat, s-au realizat mai multe concentrații. Efectul extractelor a fost evaluat comparativ cu colonia martor.

Extractul de *Berberis vulgaris* (1% alcaloizi exprimați în berberină) a avut efect inhibitor total asupra germinării și creșterii ciupercii *Coniothyrium concentricum*, la concentrația de 250 $\mu\text{g/ml}$. Efectul inhibitor al extractului a crescut proporțional cu concentrația acestuia în mediul de cultură (Czapek-agar).

Efect inhibitor asemănător, asupra ciupercii fitopatogene, a avut și extractul de *Chelidonium majus*. La o concentrație de 250 $\mu\text{g/ml}$ mediu de cultură, extractul a avut efect fungicid.

Extractul vegetal total de *Solanum nigrum* (1% alcaloizi exprimați în solanină) a avut un efect inhibitor mai slab asupra speciei *Coniothyrium concentricum*, comparativ cu extractele vegetale de *Berberis vulgaris* și *Chelidonium majus*.

Activitatea inhibitoare a extractelor vegetale testate este determinată de tipul de alcaloizi și concentrația acestora în mediul de cultură.