STUDIES ON THE IMPACT OF *PAEONIA SUFFRUTICOSA* AND *HEDERA HELIX* EXTRACTS ON *PHYTOPHTHORA INFESTANS* AND *PSEUDOPERONOSPORA CUBENSIS* ZOOSPORE RELEASE AND GERMINATION

STUDII ASUPRA MODULUI DE ACȚIUNE A EXTRACTELOR PE BAZĂ DE *PAEONIA SUFFRUTICOSA* ŞI *HEDERA HELIX* ASUPRA ELIBERĂRII ŞI GERMINĂRII ZOOSPORILOR DE *PHYTOPHTHORA INFESTANS* ŞI *PSEUDOPERONOSPORA CUBENSIS*

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Abstract: *In this paper, we studied the influence of some plant extracts upon Phytophthora infestans and Pseudoperonospora cubensis zoospores releasing and germination. We have tested the extracts obtained from Paeonia suffruticosa and Hedera helix macerated in acetone in different concentrations. There was observed the inhibition of zoospores releasing and germination.*

Rezumat: *În această lucrare este studiată influența unor extracte din plante asupra eliberării şi germinării zoosporilor de Phytophthora infestans şi Pseudoperonospora cubensis, agenții patogeni ai manelor la tomate şi castraveți. În acest sens au fost testate extractele din Paeonia suffruticosa şi Hedera helix macerate în acetonă şi aplicate în concentrații diferite. Au fost observate inhibarea eliberării zoosporilor precum şi a dezvoltării filamentelor de germinare.*

Key words**:** *plant extracts downy mildew of tomatoes and cucurbits, zoospore releasing, zoospore germination*
Cuvinte cheie: *extracte din plante, mana tomatelor şi castraveților, eliberarea zoosporilor, germinarea zoosporilor*

INTRODUCTION

In the European Union, the policy regarding the plant protection or environment protection conducted to using small amounts of chemical products, which contained polluting active substances with a negative impact on the ecosystem were those are applied. (KOWALESKI Anne, SCHMITT Annegret, 1993)

The products for plant protection based on copper (copper hydroxide, copper ox chloride, copper sulphate, copper oxide), do to a wide application against oomycetous fungi, lead to soil pollution, (CRUEGER G., 2002). In order to avoid this situation, the scientific society is trying to find some alternatives to replace the harmfully products with new ones based on naturally occurring active substances likewise plant extracts. (LATTEN J., 1994; BLAESER P., STEINER U., DEHNE H. W., 1998).

Following some studies conducted in the patho-systems *Phytophthora infestans/Lycopersicum esculentum* and *Pseudoperonospora cubensis/Cucumis sativus*, the extracts based on *Paeonia suffruticosa* and *Hedera helix* inhibate the pathogens of downy mildews of cucurbits and tomatoes. (CARABET A. F., LAUER K. F., 2006).

MATERIAL AND METHOD

To test the effects of extracts on release and germination of zoospores, aqueous acetone extracts were used. Fresh plant material (each 20g) was homogenized (2 min) in 100 ml aqueous acetone 20%.

From the acetone extract (20 gFW in 100 ml 20% acetone) of *P. suffruticosa* and *H. helix* a series of dilutions (5%, 2.5%, and 0.65%) was prepared with 20% aqueous acetone. Two hundred µl of the dilutions were pipetted in test tubes and for evaporation of the organic solvent in the extracts, the test tubes were kept open for 18 h under the hood. Into control tubes, 200µl 20% aqueous acetone was pipetted. Then, 200µl of sporangia suspension of *P. suffruticosa* and *H. helix* (10^5 sporangia /ml) were added to the extracts. The volume was adjusted to 400µl with sterile distilled water. After incubation of the mixture for 4 h at 4ºC, the zoospores releasing was evaluated.

To examine the influence of the extracts on germination and germ tube growth of zoospores, sporangia suspension was incubated first for 2 h at 4ºC for releasing zoospores, subsequently 200µl of the sporangia/zoospores suspension were pipetted to the extract dilutions (each 200µl) and the mixtures incubated at 17ºC in the dark. Six h after incubation, the length of germ tubes were observed. (Evangelia RHOENER, CARABET A. F., BUCHENAUER H., 2004)

RESULTS AND DISCUSSION

In *in vitro* tests, extracts of *P. suffruticosa* and *H. helix* inhibited in a wide dilution range release of zoospores from sporangia of *Phytophthora infestans* and *Pseudoperonspora cubensis*. Similarly, both extracts proved to be also very effective in inhibiting germination of zoospores. The inhibition of zoospores releasing is represented in figures 1, 2, 3, 4, 5, and 6.

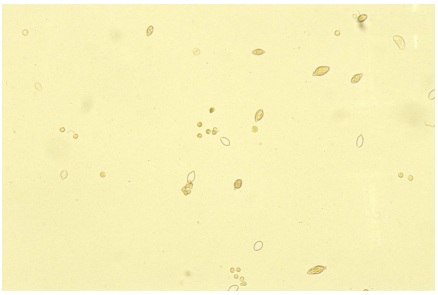

Figure 1. *Phytophthora infestans* zoospores releasing in control. Original.

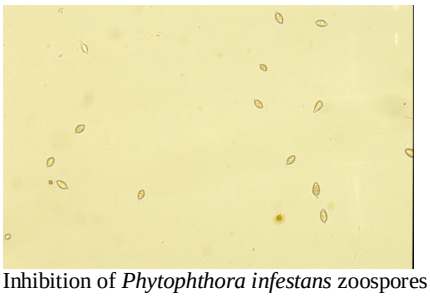

Figure 2 Inhibition of *Phytophthora infestans* zoospores release in the probe with *Paeonia suffruticosa* (0.6 %). Original.

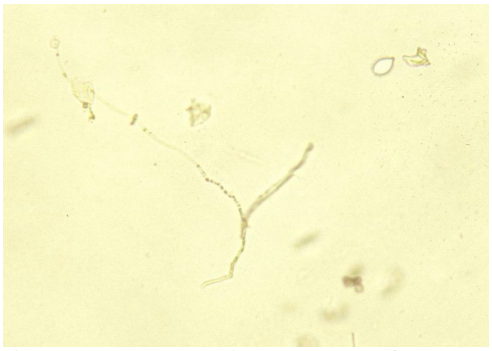

Figure 3. The length of the germination tube of *Phytophthora infestans*, 16 hours after zoospores releasing. In control. Original.

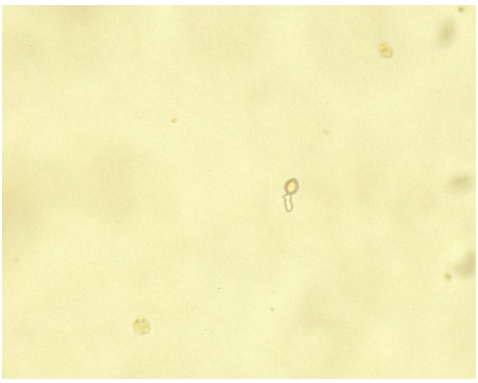

Figure 4. Length of germination tube of *Phytophtora infestans*, 16 hours after zoospores releasing, under influence of extract of *Paeonia suffruticosa* 0.6%. Original

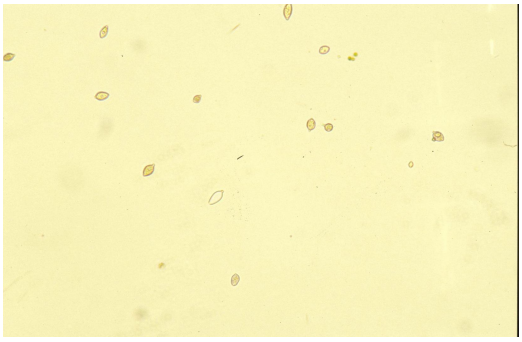

Figure 5. Inhibition of *Phytophthora infestans* zoospores releasing in the probe with *Hedera helix* (0.15%). Original.

Figure 6. Length of infection tube 24 hours after zoospores releasing, under influence of extract of *Hedera helix* 0.3%. Original

CONCLUSIONS

Experimental research showed that the inhibition of zoospore releasing occurring at a concentration of 0.15% in the case of *Hedera helix* and by using a concentration of 0.6% in case of *Paeonia suffruticosa*.

In addition, the development of germination tube was affected in both cases when we are using the extracts of *Paeonia suffruticosa* and *Hedera helix*.

In the terms of biological control an diseases, in our case the control of downy mildew on cucumber ant tomatoes, the extracts of *Paeonia suffruticosa* and *Hedera helix* shown a strong efficacy against studied pathogens, so applying those extracts we are able to reduce the negative impact of chemical products in environment.

LITERATURE

1. BLAESER P., STEINER U., DEHNE H.W., *"Fungizide Wirkstoffe aus Pflanzenextrakte.*Mitt. a.d. Biol. Bundesanst. 357 p. 167, 1998.
2. CARABET A.F., LAUER K.F., *Studies concerning the mobility of the active substance obtained from the extract of Paeonia suffruticosa in the patho-system Pseudoperonospora cubensis/Cucumis sativus,* Lucrari Stiintifice, vol. 49, seria Agronomie, Iasi, 2006.
3. CRUEGEER G., *Pflanzenchutz im Gemuesebau*, Verlag Eugen Ulmer GmbH Stuttgart, 2002.
4. KOWALESKI ANNE, SCHMITT ANNEGRET, Gesunde Pflanzen, 2 p. 45-46, 1993.
5. LATTEN J., *Biologische Bekaempfung pytopathogener Pilze mit Hilfe von Pflanzen extrakten,* Diss., Univ. Giessen, 1994.
6. RHOENER EVANGELIA, CARABET A. F., BUCHENAUER H.,*Effectivenes of plant extracts of Paeonia suffruticosa and Hedera helix against diseases caused by Phytophthora infestans in tomato and Pseudoperonospora cubensis in cucumber*, Journal of plant diseases and Protection, 111 (1), 83-95,2004.