PARASITIC AND SAPROPHYTIC MICROMYCETES IN SOIL OF GREENHOUSES WITH TOMATOES(I)

MICROMICETE PARAZITE ŞI SAPROFITE DIN SOLUL SERELOR CU TOMATE

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Abstract. *The work presents the result of investigations made upon micromycetes soil in greenhouses cultivated with tomatoes. Were been recorded, at various dilutions, between 8800 and 18000 conidia/g soil. The author presents the diagnostic at five species of Penicillium, two species of Aspergillus, and one species of Cladosporium, Scopulariopsis, Verticillium, Alternaria, Rhizopus and Ceratocystis.*

The spectrum of the micromycetes from soil varies very much in the cultivated lots, because interfere the influence of the working made for planting and the plants influence during their growth. Towards the previous situation of planting, it can be seen the alteration of the micromycetes spectrum both in quantily and in variability of isolated species.

MATERIAL AND METHOD

After tomatoes have been planted, have been gathered tests from soil which were brought to lab for analyses. In order to determine the micromycetes from soil, the petries were sterilized in which was put Czapek medium which has following compozition: NaNO3 - 3 g ; K2 HPO4 - 1 g ;MgSO4 .7 H2O - 0,5 g ; KCl - 0,5 g ; FeSO4 .7H2O - 0,01 g ; Sucroze - 30 g; Agar - 15 g; distiled water -1000 ml. The petries were sterilized. The seeding was made on 20-th June 2007 and have been Thermostated at 220C. Two dillutions have been made: 10-4 and 10-6 , for this were used five petries for each dillution and test. After the colonies of micromycetes have appeared, there were photographied on 25-th June 2007.

RESULTS AND DISCUSSIONS

After counting the colonies, we found the following results:

- at test I, at dillution 10-4 at V-1- have been registred an average of 88,00 germs /g solil and at dillution 10-6 at V-1 an average 32,000 germs /g solil;
- at test II, at dillution 10-4 at V-2- an average of 52,000 germs micotici/g solil and at dillution -6 V-2- an average of 18,000 germeni micotici/g sol.

In Petri vassels have been identified the following micromycetes:

Test I

1 0-4 V-1R – 1 = 16 colonies:

8 colonies *Penicillium coryophilum*
1 colony *Cladosporium lignicolum*
1 colony *Mucor sp.*
1 colony *Scopulariopsis brevicaulis*
2 colony *Aspergillus fumigatus*
1 colony *Micelii sterile*

R – 2 = 6 colonies:
4 colonies *Penicillium brevi-compactum*
2 colonies *Penicillium coryophilum*

R – 3 = 8 colonies:
5 colonies *Penicillium coryophilum*
2 colonies *Mucor sp*
1 colony Micelii sterile

R – 4 = 7 colonies:
3 colonies *Penicillium brevi-compactum*
1 colony *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
1 colony *Cladosporium lignicolum*
1 colony Micelii sterile

R – 5 = 7 colonies:
2 colonies *Penicillium brevi-compactum*
3 colonies *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
1 colony *Micelii sterile*

10-6 V-1

R – 1 = 4 colonies:
2 colonies *Verticillium lateritium*
2 colonies *Alternaria humicola*

R – 2 = 3 colonies:
1 colony *Penicillium coryophilum*
2 colonies *Rhizopus nigricans*

R – 3 = 4 colonies:
1 colony *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
2 colonies *Verticillium lateritium*

R – 4 = 2 colonies:
1 colony *Penicillium brevi-compactum*
1 colony *Ceratocystis paradoxa*.

R – 5 = 3 colonies:
3 colonies *Penicillium frequetans*

Test II

10-4 V-2R – 1 = 7 colonies:
1 colony *Alternaria tenuis*

1 colony Aspergillus terreus
4 colonies *Cladosporium lignicolum*
1 colony *Penicillium rugulosum*
R – 2 = 6 colonies:
1 colonie *Aspergillus funiculosus*
3 colonies *Penicillium brevi-compactum*
2 colonies *Verticillium lateritium*
R – 3 = 4 colonies:
2 colonies *Penicillium rugulosum*
2 colonies *Micelii sterile*
R – 4 = 4 colonies:
3 colonies *Penicillium brevi-compactum*
1 colony *Humicoloa grisea*
R – 5 = 4 colonies:
1 colony *Penicillium brevi-compactum*
2 colonies *Penicillium ochraceum*
1 colony *Cladosporium lignicolum*
10-6 V-2 R - 1 = 1 colony:
1 colony *Penicillium coryophilum*
R - 2 = 2 colonies:
Penicillium rugulosum + Paecilomyces marqandii
R – 3 = 1 colony:
1 colony *Penicillium coryophilum*
R – 4 = 3 colonies:
3 colonies *Penicillium coryophilum*
R – 5 = 1 colony:
1 colony *Micelii sterile*

The analyses of the tests from the soil in June, prove the fact that the presence of high temperatures and of bigger plants made that the spectrum of micromycetes from soil to divesify and so have been isolated: 5 species of *Penicillium*, 2 species of *Aspergillus* and 1 specie of *Cladosporium*, *Scopulariopsis, Verticillium, Alternaria, Rhizopus* and *Ceratocystis*.

In the soil tests have been observed 5 species of *Penicillium*: *Penicillium coryophilum, Penicillium brevi-compactum, Penicillium rugulosum and Penicillium frequetans*, species which have been descried in the prewions work and *Penicillium ochraceum*.

In the folloing we will diagnost only the new species observed in the soil tests analized in June 2007.

1. ***Penicillium ochraceum*** (Bainier) Thom, The Penicillia, p. 309-310 (1930); Gilman, A manual of Soil Fungi, p. 272 (1959);

The colonies developed on medium Czapek agar reach 3 cm in diameter after 10 days. They have the surface more or little floccos and 2-3 mm hight. At first the colonies are velvety, and then floccos, with white margins and wrinkles. On the superior side appear drops and the other side is yellow to olive in colour.

The conidiophores have 150 x 4 μm and thick walles. The heads form colums. The conidiophores have branches of 15-17,5 x 3 μm, metulas of 10 x 2,5 μm and fialides of 8-10 μm. The conidies are subglobose of 3 μm with thick walles.

Micromyceta is qnoted only once in the country be Racoviță A and colab from Transylvania in 1969 from salame, and we qnote it first from soil.

Have been pointed 2 species of *Aspergillus: Aspergillus funiculosus* and *Aspergillus terreus*. Because the full description of this species *Aspergillus funiculosus* has been made prewionsly we will give the full data only for the other species.

2. Aspergillus terreus Thom, Thom and Church, Ann. J. Botany V, p. 85-86 (1918); Gilman, A Manual of Soil fungi, p. 225 (1959); Raper and Fennell, The genus Aspergillus, p. 568, fig. 128 (1965).

The colony developed on Czapek medium agar has a pink colour with shades of cinamon bark and yellow brown on the other side. The conidiophores give the fluffy aspect of the surface of the colony. Conidiophores have 150 - 200 x 5 μm, by pliant and ends with a bladder of de 12,5 - 15 μm in diameter, which support, a two row of fialides at end. The first layer of fialides has 7 - 9 x 2 - 2,5 μm, and those exterior has 5 -7 x 2μm. These are compact and eliminate the conidiouses of elliptical to globose, de 2 -2,5 μm with smooth surface.

Micromyceta has been pointed before on tanned skin by Ioniță and colab. in 1976 and from soil by Niță L. and Balinschi Irina in 1966, Lucia Turcu in 1971, 1974 şi 1975 from Cluj and Viorica Iacob from Iaşi in 1973.

3. Cladosporium lignicolum Corda, Icon. I, fig. 2067, p. 14 (1837); Massee, Brit. Fung. Fl. III, p. 394 (1885); Gilman, A Manual of Soil Fungi, p. 334 (1959).

Micromyceta develops on Czapek medium agar a black colony, circular, with the central zone bulging, of 1 -1,5 cm in diameter. The conidiophores are short, branched and sustain conidiouses ellipsoidal put in short chains or only by two. Their colour is brown- black of 8-10 x 5 μm. Micromyceta is new for România .

4. Scopulariopsis brevicaulis (Sacc.) Bainier, Bull. Trimest. Soc. Mycol. Fr. XXIII, (1907); Ellis, Dematiaceous Hyphomycetes, p. 327, fig. 224 A (1971).

On Czapek medium agar, after five days of thermostated, the colony is withe , with short conidiophores of 10 - 15 μm. At the beginning, conidiouses are withe-beije and then become slight brown. They are put in short chains, the shape is almost spheric, smooth at the beginning, then become slight and have 7 x 8 μm.

Micromyceta is cosmopolit, has been observed on defferent mediums: on frescoes (Alice Săvulescu, 1960), on paper (Alice Săvulescu, 1971), on tanned skin (Viorica Lazăr, l967 and Alice Săvulescu 1970) walls of the coves (Lörenti, 1966) and soil Lucia Turcu, 1974,1975).

We mention it from the soil of greenhauses cultivated with tomatoes.

5. Alternaria alternata (Fr.) Keissler, Beih. Bot. Zbl., 29, p. 434 (l912); Ellis, Dematiaceous Hyphomycetes, p. 465, fig. 330 (1971).

Micromyceta develops colonies brown-black, covered by conidiophores which are short, brown septate. The conidiouses appear in chains, they are appearance of blackberry, brown-black, very varied as dimmension and has 30-36 x 15 μm.

In literature is pointed on plants and leftovers of the plants in the soil.

6. Verticillium lateritium Berkeley, Cooke, Brit. Fgi., p. 635 (1871); Gilman, A Manual of Soil Fungi, p. 304 (1959).

Micromyceta develops on Czapek medium agar circular colonies, hemisferice, of red-brown at maturity but delimitted by a white zone. The conidiophores are very fine, with rare branches that sustain long fialides of 7,5 x 2 μm which broadcast many conidiouses ovate, of 2-3 x 2 μm, smooth.

The micromyceta a found by Negru Al. on different vegetables cultivated (l966, 1972), by C. Sandu-Ville şi colab. on dalii and by researcher from Cluj which has been determine the fungus of soil, Lörinczi (1970) and Lucia Turcu (1974, 1975). We point this fungus from the soil the greenhausse cultivated with tomatoes.

7. Rizophus nigricans Ehrenb., Nova Acta Acad. Leop. X, p. 198 (1820); Sacc., Syll. Fung. VII, p. 212 (1888);

Micromyceta develops very quickly a coloniy made of hialines hyphe, very fine on which appear hialines sporangioforouses that sustin the sporipheric heads of black colour. The sporangioforouses that are 1-1,5 cm appear by two and have a diameter of 25-40 μm. The columelas has 70 x 90 μm and sustains the round or oval spores of 10 x 7,5 μm.

The fungus is cosmopolit and we find it very ofen on different layers from the soil.

8. Ceratocystis paradoxa (Dade) C. Moreau, Rev., Mycol., XVII, p. 22 (1952); Ellis, Dematiaceous Hyphomycetes, p. 31, fig. 5A (1971) .

Micelian colony is brown at the maturity become black. The conidiophores are shorts of 50 x 5 μm. On the micelian hyphes appared the artroconidiouses are light brown, with double walles, longer than wider of 12-17,5 x 5-6 μm. The conidian stadium belongs to Thielaviopsis.

The fungus is qnoted in the bibliografy from the parte of dead plants cultivated in the tropical area. In our country is qnoted only one specie *Ceratocystis longilostellata* from the roots of the oak. In the soil of the greenhauses this year have been registred high temperatures which favorized the appearance of micromycete.

9. Humicola grisea Traaen, Nyt. Mag. Naturvid., 52, p. 31 (1914); Gilman, A Manual of Soil Fungi, p. 6o, fig. 29B (1971).

The fungus forms at the surface of the medium hypheae septate, hialines of 4 μm in diameter. The micelian colony covers a mass of yellow-brown conidiouses. The conidiophores have short aside branches that sustain the conidiouses with double walles and a granular surface of de 9 - 15 μm.

Micromyceta has been qnoted before from soil by Viorica Iacob din sol de at Podu Iloaiei - Iaşi, in 1973 and by Ioachimescu Dinulescu Mariana from rotten wood in mines in 1978.

10. Paecilomyces marquandii (Massee) Hughes, Studies in microfungi, Mxcol. Pap. 38,1-8 (1951); Domsch K., Gams W., Pilze aus Agrar, p. 93 (1970).

In order to determine micromyceta, Petri vassels have been refrigerated. After 3 monts the colonies of Penicillium rugulosum have been covered by a micelium of beije colour that belongs to this micromycete. Differenthy from the fructifies of the penicillium or spicaria, the appearance of branches and fialides is irregular. Singular fialides or grouped eliminate conidiouses which are spheric of 2 -2,5 μm. Micromyceta is new for România.

We attach the photos and the microscophic lamellas have been included in micologic Herbal of Moldavia „C. Sandu-Ville".

CONCLUSIONS

1.The study of micromycetas from soil is very useful taking into account the fact that follows the plantation of rasads which at first phases of development , are extremely sensible.

2.The presence of parasitic micromycetas has an economic implication because it can compromise the culture and so a new disinfection of the soil is needed and of course another replantation which modifiens the period of development of plants, delayning the valorification of obtained production.

3.The analyses of the tests from soil harvested in June 2007 proves the fact that the presence of high temperatures and of more developed plants made that the spectrum of micromycetas from soil to modify both in quantily and of variability of isolated species. It is noticed the presence of new species for România or qnoted for the first time in the soil cultivated with tomatoes like: Cladosporium lignicolum, Paecilomyces marquandii, Ceratocystis paradoxa, Verticillium lateritium, Scopulariopsis brevicaulis, Penicillium ochraceum.

4.Out of the sum of izolated species, 16,2% represent micromycetes new for our country or qnoted for the first time in soil.

REFERENCES

1. Bontea Vera, 1985 - *Ciuperci parazite şi saprofite din România,* Ed. Acad. R.S.R.
2. Constantinescu O., 1974 - *Metode şi tehnici în Micologie*, Ed. CERES, Bucureşti.
3. Domsch K., Gams W., 1970, - *Pilze aus Agrarböden,* VEB-Gustav Fischer Jena
4. Ellis M.B., 1971 - *Dematiaceous Hyphomycetes*, England.
5. Gilman J.C., 1957 - *A Manual of Soil Fungi, I*owa , U.S.A.
6. Lindau G. 1910 - *Fungi Imperfecti*, Leipzig, Germania
7. Migula W., 1913 - *Kryptogamen Flora*, Germania
8. Raper K., C. Thom and Dor. Fennell, 1968 – *A Manual of the Penicillia*, London.
9. Raper K., Doprothy Fennell, 1965 - *The genus Aspergillus*, Baltimore.