

***Emericella quadrilineata* (Thom&Raper) C.R.Benjamin (Ascomycetes): First Reports
from Türkiye**

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Abstract

Emericella quadrilineata (Thom&Raper) C.R.Benjamin collected from elementary school atmosphere in Izmir and were examined for colonial and morphological properties via visual and high resolution light microscopy. This species is reported for the first time in Turkey.

Key words: *Emericella*, Ascomycetes, Turkey,

Introduction

Microfungi whose presence in nature, depend on the interaction of biological factors are important eucaryotic microorganisms, which are spread in all layers of the earth such as hydrosphere and atmosphere. They are present mostly and most widely in litosphere that's to say in soil and with other microorganism groups, they play an important role in organic and inorganic matter cycle; they also greatly contribute to the formation of humus, which is one of the effective factors for the fertility of the soil (1,2). Microfungus flora which lives as human, plant and animal parasites and develop during the storage of grain, animal feed, various fruit and vegetables and other food or especially toxigenic or potential allergen microfungi, determine the quality of the air in inner and outer environment has gained importance in recent years (2-16). Therefore, as regard to human and environmental health, food technology and microbiological research on industrial production, new microfungi species have been increasingly important. A number of species belonging to these genera have been isolated and identified in studies carried out in Turkey (17-29). As the result of microflora determination, studies performed for this purpose, a checklist including *Aspergillus*, *Penicillium* species and related genus, which can greatly be found in soil and has ecological, economical and medical importance, has been prepared and this checklist is renewed annually (30).

In our research, we aimed to determine the indoor potential of allergen microfungi according to our results, among the 17 different microfungus, which were isolated from five primary schools in Seferihisar, Izmir 14 species belonging to *Aspergillus* and 2 species belonging to teleomorph *Emericella* genus were identified. According to Asan's checklist (30), our isolate belonging to *Emericella quadrilineata* (Thom&Raper) C.R.Benjamin is a new record for Turkish mycoflora.

Materials and Methods

In our research, which has carried out in five primary schools in Seferihisar, which is 45 km away from İzmir, between April 2004 and February 2005, air samples have been collected by volumetric impactor sampler Merck Mas 100 Air Sampler to determine potential allergen fungus flora in the building. In every sampling period, total 25 samples have been collected in petri plate containing The Rose-Bengal Chloramphenicol Agar Base (Oxoid CM549) and Chloramphenicol Selective Supplement (Oxoid SR78) was used for isolation of the fungi. The agar medium was made from: mycological peptone 5.0 g, glucose 10.0 g, dipotassium phosphate 1.0 g, magnesium sulphate 0.5 g, Rose- Bengal, 0.05 g, agar 15.5 g, sterile pure water 1000 ml. Chloramphenicol Selective Supplement contains 0.05 g chloramphenicol, equivalent 0.1 g per litre of medium. These samples have been collected from every building and garden.

Fungi were identified to genus level according to Barnett and Hunter (1) and to species level according to Raper and Fennell (31) and Klich (32). Our isolate was incubated for identification in Czapek Yeast Agar (CYA25 and CYA37) medium at 25°C and at 37°C; in Czapek Dox Agar (CZ) medium, in Czapek Yeast Agar medium with 20% sucrose (CY20S) and in Malt Extrakt Agar (MEA) medium at 25°C for 7 days and incubation was carried out for 14 days for development of ascospores.

Results and Discussion,

Subgenus: *Nidulantes* Section: *Nidulantes*

Emericella quadrilineata (Thom&Raper) C.R.Benjamin

Anamorph: *A.tetrazonus* (Thom&Raper) Samson & W.Gams in Samson & Pitt, Adv. *Penicillium Aspergillus* System: 48, 1985, Holotype IMI 89351.

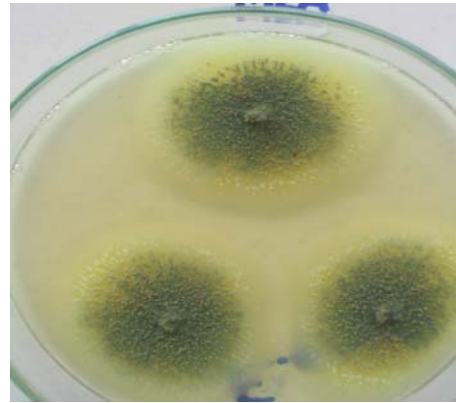
Colony Characteristics

Colony diameter after seven days incubation on CYA at 25°C was 40-55 mm; colony velutinous; plane; colony center dull grey green, mycelium greyish white colour at margin; cleistothecia abundant and brownish purple (Figure1A); reverse reddish brown. Colonies on CYA at 37°C was 40-50 mm in diameter; colony velutinous; radially; colony center dull grey green; cleistothecia dull buff colour; colony reverse purple brown. On MEA at 25°C colony diameter after seven days incubation was 40-60 mm; colony plane; colony center dull grey green; cleistothecia abundant, pinkish brown colour; colony reverse greenish yellow (Figure 1B). On CY20S at 25°C colony diameter was 45-50 mm; colony radial; mycelium white

colour at margin; colony center dull olive green and compact vegetative mycelium present in center; cleistothecia abundant especially in colony center, yellowish creamy colour; colony reverse dark pinkish brown colours (Figure 1C). Colonies on CZ at 25°C was 40-42 mm in diameter; colony velutinous; plane; colony center dull grey green; cleistothecia abundant and dull buff colour; colony reverse dark, brown. In all mediums, soluble pigment was absent.



A



B



C

Figure 1. A : Colonies on CYA medium in 25⁰C at 7 days.

B : Colonies on MEA medium in 25⁰C at 7 days

C : Colonies on CY20S medium in 25⁰C at 7 days.

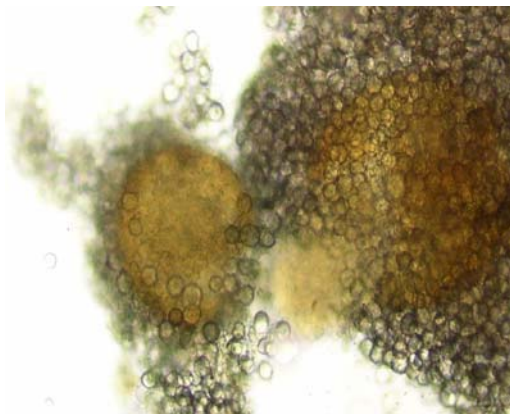
Microscopic Characteristics

Conidial heads on CYA25 green, radiate; stipes 100-200 x 4,0-6,0 μm , smooth-walled and brownish; vesicles 9,0-14 μm , biseriate; metulae 5,0-7,0 x 2,5-3,5 μm ; phialides 5,0-8,0 x 2,5-3,0 μm ; conidia were 3,0-4,0 μm in diameter, globose and slightly roughened (Figure 2A). Cleistothecia enveloped by hülle cells, globose, 120-200 μm in diameter, brownish red at maturity and abundantly throughout the colony (Figure 2B); ascospores bright red, lenticular shaped, 4,0-6,0 x 3,0-4,0 μm , smooth walled, typically four crests on the ascospores (Figure 2C-2D); hülle cells abundant, yellowish, globose, 14-20 μm in diameter (Figure 2E).

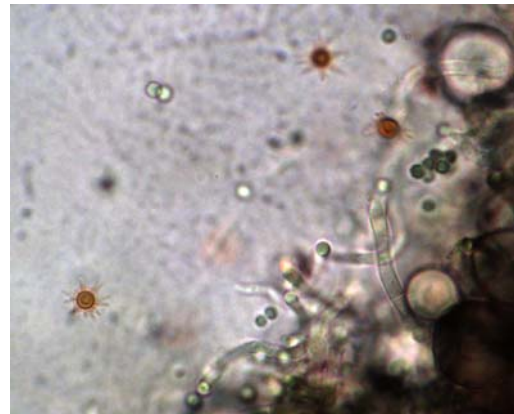
In our research, 14 species belonging to *Aspergillus* and two species belonging to *Emericella* genus were identified in 17 different microfungus among 7122 fungi colonies. Asan (30) reported that there were 200 *Aspergillus* species isolated from different regions of Turkey. According to our finding, *Emericella quadrilineata* was widespread distribution as *Aspergillus* species are common in soil (31,32) Colony characteristics and microscopical features of *Emericella quadrilineata* species are in accordance with Raper & Fennell (31), Klich (32) and Klich & Pitt (33) that the accept as taxonomical references (31-33). Our isolate (Figure 2A-E) that can be distinguished with the features such as brown-stiped biseriate conidial heads, red hülle cells, ascospores with 4 short-longitudinal crests is a soil fungus which shows wide spread distribution. Our microfungi was isolated from four primary schools' inner and outer air in August when the temperature was 20-26°C at night and 30-38°C during the day. It was in accordance with the findings of *E. quadrilineata*, habitat findings (32) that were reported to show relatively high frequencies between 26-35°C temperatures.



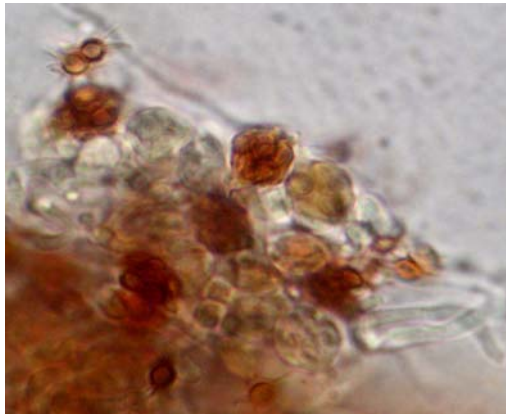
A



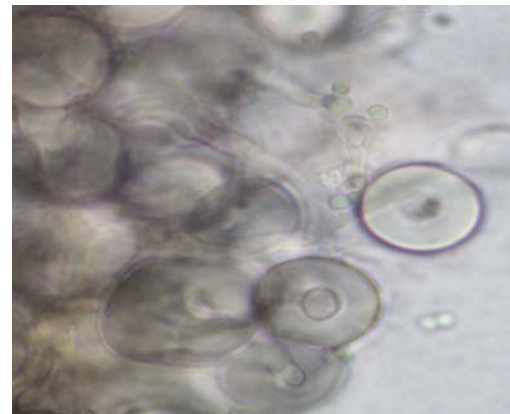
B



C



D



E

Figure 2. A: Conidial heads on CYA medium in 25⁰C

B : Cleistothecium and hülle cells on CYA medium in 25⁰C

C: Ascospores on MEA medium in 25⁰C at 15 days

D: Ascus and ascospores on MEA medium in 25⁰C at 15 days

E: Hülle cells on MEA medium in 25⁰C at 15 days

REFERENCES

1. Barnett, H.L., and Hunter, B.B., (1999), Illustrated Genera of Imperfect Fungi. Fourth Ed. 218 pp., APS Press, St.Paul, Minnesota, USA.
2. İlhan, S., Demirel, R., Asan, A., Baycu, C., Kınacı, E., (2006), Colonial and Morphological Characteristics of Some Microfungal Species Isolated from Agricultural Soils in Eskişehir Province (Turkey),.
3. Colakoğlu, G., (1996a), Fungal spore concentrations in the atmosphere at the Anatolia Quarter of Istanbul, Turkey. Journal of Basic Microbiology, 36, 155-162 .
4. Colakoğlu, G., (1996b), Mould counts in the atmosphere at the Europa Quarter of Istanbul, Turkey. Journal of Basic Microbiology, 36, 389-392.
5. Colakoğlu, G., (1996c), The variability of fungal flora in the air during morning and evening in 1994, Turkey. Journal of Basic Microbiology, 36, 393-398.
6. Colakoğlu, G., (2003), Airborne fungal spores at the Belgrad forest near the city of Istanbul (Turkey) in the year 2001 and their relation to allergic diseases. Journal of Basic Microbiology, 43, 376-384.
7. Simsekli, Y., Gucin, F. and Asan, A., (1999), Isolation and identification of indoor airborne fungal contaminants of food production facilities and warehouses in Bursa, Turkey. Aerobiologia, 15, 225-231.
8. Sen, B. and Asan, A., (2001), Airborne fungi in vegetable growing areas of Edirne, Turkey. Aerobiologia, 17, 69-75.
9. Sarıca, S. et al, (2002), Monitoring indoor airborne fungi and bacteria in the different areas of Trakya University Hospital (Edirne-Turkey). Indoor and Built Environment, 11, 285-292,.
10. Sarıca-Okten, S. et al, (2005), Airborne fungal concentrations in east patch of Edirne City (TURKEY) in autumn using two sampling Methods. Trakya University Journal of Science, 6(1), 97-106.
11. Asan, A. and Ekmekci, S., (2002). Contribution to the Colonial and Morphological Characteristics of some *Aspergillus* species Isolated from Soil. Jour.Fac.Sci.Ege Univ. 25:121-139.
12. Asan, A., Sen, B., Sarıca, S., (2002), Airborne Fungi in Urban Air of Edirne City. Biologia, 57 (1): 59-68.

13. Asan, A., Kırgız, T., Sen, B., (2003), Isolation, Identification and Seasonal Distribution of Airborne and Waterborne Fungi in Terkos Lake (Istanbul-Turkey). Jour. Basic Microbiol. 43 (2): 83-95.
14. Asan, A., İlhan, S., Sen, B., (2004), Airborne Fungi and Actinomycetes Concentrations in the Air of Eskişehir City (Turkey). Indoor and Built Environment, 13:63-74.
15. Aydoğdu, H., Asan, A., Tatman-Otkun, M., Ture, M., (2005), Monitoring of Fungi and Bacteria in the Indoor Air of Primary Schools in Edirne City, Turkey. Indoor and Built Environment, 14, 5: 411-425.
16. Yazicioglu, M., Asan, A., Ones, U., Vatansever, U., Sen, B., Ture, M., Bostancioglu, M., Pala, O., (2004). Indoor Airborne Fungal Spores and Home Characteristics in Asthmatic Children from Edirne Region of Turkey. Allergology et Immunopathology, 32(4): 197-203.
17. Öner, M., (1970), Soil Microfungi of Turkey. Mycopathology Mycol Appl 42: 81-87.
18. Öner, M., (1973), Atatürk Üniversitesi Erzurum Çiftliği Eđerli Dağı Kuzey Yamacı ve Trabzon-Hopa Sahil Şeridi Mikrofungus Florası ile İlgili Bir Araştırma. Erzurum: No 21: 17: Atatürk Üniv. Yay.
19. Öner, M., (1974), Seasonal Distribution of Some Fungi Imperfecti in the Soils of Western Part of Anatolia. Mycopathology Mycol Appl 52: 267-288.
20. Ekmekçi S., (1975), Güney Yarı Ege Bölgesi Topraklarından İzole Edilen *Penicillium* ve *Aspergillus* türleri. Bitki 2: 19-29.
21. Hasenekoğlu, İ., (1982), Erzurum Et Kombinası Civarındaki Kirlenmiş Toprakların Mikrofungus Populasyonu. Atatürk Univ Fen Fak Derg 1: 409-416.
22. Hasenekoğlu, İ., (1985), Sarıkamış Civarı Orman, Çayır ve Tarla Topraklarının Mikrofungus Florası. Kükem Dergisi 8: 40-46.
23. Hasenekoğlu, İ., (1987), Doğu İğdır Ovası Çorak Topraklarının Mikrofungus Populasyonu Üzerine Bir Ön Araştırma. Kükem Dergisi 10: 53-59.
24. Ates, M., (1991), İzmir ve Civarındaki Soğuk Hava Depolarında Depolanan Elmalarda, Depolama Sırasında Görülen Bozukluklardaki Küf Florasının Saptanması Konusunda Bir Araştırma.
25. Hasenekoğlu, İ and Azaz, AD., (1991), Sarıkamış Civarı Traşlanmış Orman Alanları Topraklarının Mikrofungus Florası ve Bunun Normal Orman Toprakları Florası ile Karşılaştırılması Üzerine Bir Çalışma. Tur J Bot 15: 214-226.

26. Asan, A., (1997), Trakya Bölgesi Mısır tarlaları Mikrofungus Florası I.Turk J Biol 21: 89-101.
27. Haliki, A. and Dizbay, M., (1997), İzmir-Bergama Yöresindeki Bazı Tarımsal Alanlardan Mezofilik Toprak Mikrofunguslarının İzolasyonu ve Mevsimsel Dağılımları,Tur Jour.Biol. 21: 329-341.
28. İlhan, S. and Asan, A., (2001), Soilborne Fungi in Wheat Fields of Kırka Vicinity (Eskişehir-Turkey). Biologia,56: 363-371.
29. Eltem, R. Askun,T. Sarigul,N. Ozkale, E. Efendiler,H., (2004), Colonial and Morphological Characteristics of Some *Aspergillus* Fr. Species Isolated from Vineyards in Manisa and Izmir Provinces,(Turkey). Turk.J.Botany 28: 287-298.
30. Asan, A, (2004), *Aspergillus*, *Penicillium* and Related Species Reported from Turkey. Mycotaxon,89: 155-157.
Link: <http://www.mycotaxon.com/resources/checklists/Checklist001.pdf>
31. Raper, K.B., and Fennell, D.I., (1965), The Genus *Aspergillus*. 686 pp. The Williams&Wilkins Comp. Baltimore,USA.
32. Klich, M.A., (2002), Identification of Common *Aspergillus* Species.116 pp. Centraalbureau voor Schimmelcultures, Utrecht, The Netherlands.
33. Kilch, M.A. and Pitt, J.I., (1988), A Laboratory Guide to *Aspergillus* Species and Their Teleomorphs. CSIRO, Division of Food Processing, North Ryde, NSW, Australia.