

Ecology and distribution of two parasitic fungal species (*Pyrofomes demidoffii* and *Antrodia juniperina*) on scale-leaf juniper trees in Turkey

Hasan Hüseyin DOĞAN^{1*}, Mitko KARADELEV²

¹*Selçuk University, Science and Art Faculty,
Biology Department, Campus, 42031 Konya/Turkey
e Mail; hhuseyindogan@yahoo.com*

²*Institute of Biology, Faculty of Natural Science,
Gazi Baba bb, P.O. Box 162, Skopje, 1000, the Republic of Macedonia,
e Mail; mitkok@iunona.pmf.ukim.edu.mk*

Abstract – *Pyrofomes demidoffii* and *Antrodia juniperina*, two important parasitic fungal species on *Juniperus excelsa* and *J. foetidissima* were studied on 22 localities in Turkey where its associations are best developed. The investigation into the ecology and distribution of these two poroid species was carried out during a period of two years, between October 2003 and November 2004. The fungi are presented in the paper, and their role in juniper ecosystems is discussed herewith. This is the second find of the species *Antrodia juniperina* in Turkey. Since the investigations were conducted only in some of the known localities, mostly in the western, southern and central parts of the country, many more data are expected to be obtained in the future research.

***Antrodia juniperina* / *Pyrofomes demidoffii* / Distribution / Juniper forest / Ecology / Turkey.**

INTRODUCTION

In the period between October 2003 and November 2004, within the framework of the bilateral project named “Macromycetes biodiversity in Juniper forest (*Juniperus excelsa* and *Juniperus foetidissima*) in the Republic of Turkey and the Republic of Macedonia and their comparison”, between the Faculty of Natural Science in Skopje, Macedonia, and Science and Art Faculty, Selçuk University in Konya, Turkey, there was field research in western, southern, and central parts of Turkey.

Based on Doğan’s work on PhD thesis, whereby he collected *Pyrofomes demidoffii* from Karaman-Sarveliler district, Karadelev and Doğan continued with the research on the same substrates. They were focussed on two poroid species (*Antrodia juniperina* and *Pyrofomes demidoffii*) whose distribution is known very little.

* Correspond author

The first data about distribution of both species in Turkey were given by Selik (1973), who published *Antrodia juniperina* (as *Daedalea juniperina*) and *Pyrofomes demidoffii* (as *Fomes juniperinus*), both on *Juniperus excelsa* from the area of Adana (Çamalan). Later, Işiloğlu and Watling (1992) in their work reported about *Pyrofomes demidoffii* from the area of Mersin (Erdemli) on *Juniperus* sp. in mixed conifer forest.

In general, today in Turkey there are 1,100,492 hectares of pure Juniper forest (*Juniperus excelsa* and *Juniperus foetidissima*) while before there were 3,000,000 hectares.

The Greek or Crimean Juniper (*Juniperus excelsa* M.Bieb.) occurs in the hills and mountains of the Eastern Mediterranean Basin, the Black Sea and several mountain ranges around the southern end of the Caspian Sea. It does not occur in regions with an annual precipitation much below 500 mm. In Turkey it is especially common in Anatolia. Its altitudinal range is from c. 100 m to 2300 m. It forms the tree-limit in several mountain ranges. It grows mainly on stony, rocky calcareous or non-calcareous slopes. It may form pure, open forests; it may grow mixed with *J. foetidissima* or with other conifers such as *Cedrus libani* A.Richard, *Phillyrea latifolia* L. and *Pinus* spp., or it may be part of oak-scrub communities in secondary vegetation, but not in Mediterranean maquis. *Juniperus foetidissima* Willd. mainly occupies the same habitats as *J. excelsa* and often grows in mixed forest with *J. excelsa*. Its altitudinal range is also similar, from the coast of the Black Sea up to c. 2000 m in Anatolia. It grows on dry, rocky slopes, with annual precipitation between 400 and 1,000 mm. In Turkey it grows in open places in mixed forest, with *Abies cilicica* (Ant.& Kotschy) Carr., *Cedrus libani* A.Richard, *Pinus nigra* J.F. Arnold, *Phillyrea latifolia* L., *J. excelsa* M.Bieb, *J. drupacea* Lab., *J. communis* L., *J. oxycedrus* L., *Quercus cerris* L., *Q. coccifera* L., *Q. frainetto* Ten, *Q. infectoria* Oliver.

The reason that has triggered our research goal is the study of mycodiversity in specific biotopes in order to increase the knowledge of ecology and distribution of *A. juniperina* and *P. demidoffii*, as very rare species in Europe.

The investigations were executed on selected territories and their ecosystems in Turkey (Fig. 1), such as Adana (Pozantı, Aladağ, Saimbeyli), Amasya (Akdağ, Sarimeşe), Antalya (Köprülü Kanyon, Thermessos National Park, Korkuteli), Balıkesir (Dursunbey, Kazdağı, Gölcük), Kahramanmaraş (Göksun, Andırın), Karaman (Sarıveliler), Konya (Bozkır, Seydişehir), Kütahya (Muratdağı), Mersin (Erdemli, Arslanköy, Mut) and Muğla (Fethiye, Babadağ).

MATERIALS AND METHODS

Foraging and collecting of fungal specimens were performed in August 2003. The identification of fungi was done by a microscope and reagents (Melzer reagent, 5% KOH, cotton blue, sulphovanilin etc.). The determination of the recorded species was accomplished during the field trips or afterwards, in the Mycological Laboratory, within the Faculty of Natural Science in Skopje. The most relevant species were preserved in the existing mycocollections at both faculties, and the obtained data were incorporated into the databases (KONYA and MACFUNGI).

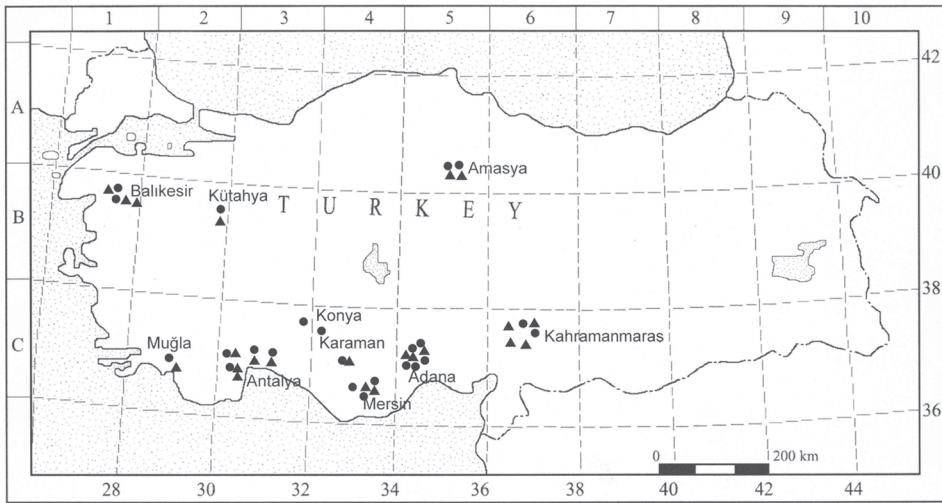


Fig. 1. Distribution map of *Pyrofomes demidoffii* (II) and *Antrodia juniperina* (+).

The material was collected on the following localities as alphabetical orders:

Antrodia juniperina

1. Adana-Pozantı (Fındıklı, Tosman district), 1400 m, 03.11.2004, on *Juniperus excelsa* in mixed forest with *J. foetidissima*, *J. drupacea*, *J. oxycedrus*, *Cedrus libani* and *Pinus brutia*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1882.
2. Adana-Pozantı (Fındıklı, Elma sekisi district), 1700 m, 03.11.2004, on *Juniperus excelsa*, in mixed forest with *J. drupacea*, *A. cilicica* and *Cedrus libani* leg. and det. Doğan and Karadelev, Doğan coll. No: 1902.
3. Adana-Aladağ (Meydan plateau), 1200 m, 04.11.2004, on *Juniperus excelsa* in mixed forest with *J. drupacea*, *J. oxycedrus*, *A. cilicica* and *Cedrus libani*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1951.
4. Amasya-Akdağ (Durucasu village), 1100 m, 18.05.2003, on *Juniperus excelsa* in clear forest, Doğan coll. No: 1298.
5. Amasya-Sarımeşe (Ardıç Düzü district), 800 m, 19.05.2003, on *Juniperus excelsa* in clear forest, Doğan coll. No: 1305.
6. Antalya-Köprülü Kanyon, 1750 m, 15.03.2003 and 20.12.2003, on *Juniperus excelsa* in clear juniper forest, Doğan coll. No: 1253.
7. Antalya-Thermessos National Park, 700 m, 16.03.2003, on *Juniperus foetidissima* in mixed forest with *J. excelsa*, Doğan coll. No: 1265.
8. Antalya-Korkuteli (Yukarı Karaman village), 1650 m, 02.05.2004, on *Juniperus excelsa* in mixed forest with *J. foetidissima*, *J. communis* and *Pinus nigra*, Doğan coll. No: 1648.
9. Antalya-Elmalı, (Çığlıkara forest, Sevindik district), 1400 m, 03.05.2004, on *Juniperus excelsa* in mixed forest with *Cedrus libani* and *Quercus coccifera*, Doğan coll. No: 1668.
10. Antalya-Elmalı (Avlan), 1400 m, 04.05.2004, on *Juniperus excelsa* in mixed forest with *Cedrus libani*, collection Doğan, coll. No: 1717.

11. Balıkesir-Dursunbey, 550 m., 07.11.2003, on *Juniperus foetidissima* in mixed forest with *Quercus infectoria*, *J. oxycedrus* and *Phillyrea latifolia*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1603.
12. Balıkesir-Kazdağı (Ağlayan çam district), 850 m, 06.11.2003, on *Juniperus foetidissima* in mixed forest with *Phillyrea latifolia*, *J. oxycedrus*, *Pinus brutia*, *Quercus frainetto*, and *Q. coccifera*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1551.
13. Balıkesir-Gölcük, 950 m., 07.11.2003, on *Juniperus foetidissima* in mixed forest with *Quercus cerris*, *J. oxycedrus*, *Acer sp.*, *Pinus nigra* and *Phillyrea latifolia*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1571.
14. Kahramanmaraş-Göksun, 1000 m, 24.04.2003, on *Juniperus foetidissima* in clear forest, Doğan coll. No: 1274.
15. Kahramanmaraş-Andırın (Elmadağ, Mercimeklik district), 1250 m, 05.11.2004, on *Juniperus excelsa* in mixed forest with *J. foetidissima*, *J. drupacea*, *A. cilicica* and *Cedrus libani*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1961.
16. Kahramanmaraş-Andırın (Elmadağ, Karlık district), 1450 m, 05.11.2004, on *Juniperus foetidissima* in mixed forest with *Cedrus libani* and *Pinus nigra*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1970.
17. Kahramanmaraş (on the way to Saimbeyli, 10 km), 1500 m, 06.11.2004, on *Juniperus foetidissima* in clear forest, leg. and det. Doğan and Karadelev, Doğan coll. No: 1984.
18. Karaman-Sarıveliler (Civandere district), 1750 m, 08.05.2004, on *Juniperus excelsa* in mixed forest with *J. oxycedrus* and *Quercus cerris*, Doğan, coll. No: 1724.
19. Kütahya-Muratdağı (Altıntaş district), 1100 m, 08.11.2003, on *Juniperus foetidissima* in mixed forest with *J. excelsa*, *J. oxycedrus* and *Quercus cerris*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1571.
20. Mersin-Arslanköy (Kavaklıpınar, Yüksek Harman district), 1450 m, 06.06.2003, on *Juniperus excelsa* in clear forest, Doğan coll. No: 1323.
21. Mersin-Arslanköy (Cocakdere district), 1450 m, 10.10.2003, on *Juniperus excelsa* in mixed forest with *Cedrus libani* and *Pinus nigra* forest, Doğan coll. No: 1467.
22. Muğla-Fethiye (Babadag), 1200 m, 05.05.2003 and 03.11.2003, on *Juniperus foetidissima* in mixed forest with *J. excelsa*, *Phillyrea latifolia*, *J. oxycedrus* and *Quercus coccifera*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1288 and 1530.

Pyrofomes demidoffii

1. Adana-Pozantı (Fındıklı village), 1300 m, 26.04.2003, on *Juniperus foetidissima*, a few trees inside of the tomb place, Doğan coll. No: 1284.
2. Adana-Pozantı (Fındıklı, Tosman district), 1400 m, 03.11.2004, on *Juniperus excelsa* in mixed forest with *J. foetidissima*, *J. drupacea*, *J. oxycedrus*, *Cedrus libani* and *Pinus brutia*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1877.
3. Adana-Pozantı (Fındıklı, Elma sekisi district), 1700 m, 03.11.2004, on *Juniperus excelsa* in mixed forest with *J. drupacea*, *A. cilicica* and *Cedrus libani*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1904.
4. Adana-Aladağ (Meydan plateau), 1200 m, 04.11.2004, on *Juniperus excelsa* in mixed forest with *J. drupacea*, *J. oxycedrus*, *A. cilicica* and *Cedrus libani*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1955.
5. Adana-Aladağ (Meydan plateau, Işık Turşu hill), 1400 m, 04.11.2004, on *Juniperus foetidissima* in mixed forest with *J. drupacea*, *J. oxycedrus*, *A. cilicica* and *Cedrus libani*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1947.

6. Amasya-Akdağ (Durucasu village), 1100 m, 18.05.2003, on *Juniperus excelsa* in clear *Juniper* forest, Doğan coll. No: 1297.
7. Amasya-Sarimeşe (Ardıç Düzü district), 800 m, 19.05.2003, on *Juniperus excelsa* in clear *Juniper* forest, Doğan coll. No: 1310.
8. Antalya-Thermessos National Park, 700 m, 16.03.2003, on *Juniperus foetidissima* in mixed forest with *J. excelsa*, Doğan, coll. No: 1262.
9. Antalya-Korkutelı (Yukarı Karaman village), 1650 m, 02.05.2004, on *Juniperus excelsa* in mixed forest with *J. foetidissima*, *J. communis* and *Pinus nigra*, Doğan coll. No: 1658.
10. Antalya-Elmalı (Çığlıkara forest, Sevindik district), 1400 m, 03.05.2004, on *Juniperus excelsa* in mixed forest with *Cedrus libani* and *Quercus coccifera*, Doğan coll. No: 1680.
11. Antalya-Elmalı (Avlan district), 1400 m, 04.05.2004, on *Juniperus excelsa* in mixed forest with *Cedrus libani*, Doğan coll. No: 1720.
12. Balıkesir-Kazdağı (Avcılar village), 850 m, 03.11.2003, on *Juniperus foetidissima* in mixed forest with *Phillyrea latifolia*, *J. oxycedrus*, *Quercus coccifera* and *Q. frainetto*, leg. and det. Doğan and Karadelev, Doğan coll. No.: 1552.
13. Balıkesir-Gölcük, 950 m., 07.11.2003, on *Juniperus foetidissima* in mixed forest with *Quercus cerris*, *J. oxycedrus*, *Acer sp.*, *Pinus nigra* and *Phillyrea latifolia*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1570.
14. Kahramanmaraş-Andırın (Elmadağ, Karlık district), 1450 m, 05.11.2004, on *Juniperus foetidissima* in mixed forest with *Cedrus libani* and *Pinus nigra* leg. and det. Doğan and Karadelev, Doğan coll. No: 1970.
15. Kahramanmaraş (from Göksun to Saimbeyli road, to Saimbeyli 10 km), 1500 m, 06.11.2004, on *Juniperus foetidissima* in clear forest, leg. and det. Doğan and Karadelev, Doğan coll. No: 1985.
16. Karaman-Sariveliler (Civandere district), 1750 m, 08.05.2004, on *Juniperus excelsa* in mixed forest with *J. oxycedrus* and *Quercus cerris*, Doğan coll. No: 1721.
17. Konya-Bozkır District, 1600 m, 23.03.2003, on *Juniperus sp.* in mixed forest of *J. excelsa* and *J. foetidissima*, Doğan coll. No: 1269.
18. Konya-Seydişehir, 1350 m, 02.11.2003, on *Juniperus excelsa* in mixed forest with *J. oxycedrus*, *Quercus trojana* and *Abies cilicica*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1486.
19. Mersin-Erdemli (Yayla Yolu), 25.03.1988, on *Juniperus sp.* in mixed conifer forest, Işıloğlu coll. No:1021 (Işıloğlu and Watling, 1992).
20. Mersin-Mut (Gökseki district), 1 600m, 26.04.2000, on *J. excelsa* in clear forest, Doğan coll. No: 485.
21. Mersin-Mut (Dağpazarı Village), 1 600m, 06.05.2001, on *J. excelsa* in clear forest Doğan coll. No: 1174.
22. Muğla-Fethiye (Babadag), 1 200 m, 05.05.2003, 03.11.2003, on *Juniperus excelsa* in mixed forest of *J. foetidissima*, *Phillyrea latifolia*, *J. oxycedrus* and *Quercus coccifera*, leg. and det. Doğan and Karadelev, Doğan coll. No: 1296.

RESULTS

As a result of the collecting trips organised in the above-mentioned localities in October 2003 and November 2004, a provisional list of localities of distribution of *A. juniperina* and *P. demidoffii* in Turkey was compiled. Number of collected specimens of *A. juniperina* and *P. demidoffii* on *J. excelsa* and *J. foetidissima* in different areas are given (Table 1).

In the area of Adana, *A. juniperina* was collected only on *J. excelsa* (9 specimen); it was more common in the locality of Aladağ (Meydan plateau), where the forest is mixed with *J. drupacea*, *J. oxycedrus*, *A. cilicica* and *Cedrus libani*. The other species, *P. demidoffii*, was more common (a total of 16 specimens). Some of the specimens were collected as parasites on *J. foetidissima* (Aladağ, Fındıklı village), but *J. excelsa* appeared as the most important host in this area: 14 specimens were collected on this substrate especially from the localities: Fındıklı (Tosman and Elma sekisi districts) and Aladağ (Meydan plateau). It seemed that in this area *J. foetidissima* was more resistant than *J. excelsa*.

In the area of Amasya, *A. juniperina* and *P. demidoffii* were collected only on *J. excelsa* (a total of 14 specimens), the reason being that in this area the juniper forest consists mainly of *J. excelsa*, while *J. foetidissima* is very rare. *A. juniperina* was more common and 10 specimens were collected. *J. foetidissima* is young (about 100 years old) than *J. excelsa* and its not so damaged or cut. On the contrary to *J. foetidissima*, the area of *J. excelsa* is damaged by local people for different purposes (for firing, for agriculture and etc.). for this reasons, *P. demidoffii* and *A. juniperina* grow very easily on *J. excelsa* than *J. foetidissima*.

In the area of Antalya, *A. juniperina* and *P. demidoffii* were collected mainly on *J. excelsa* and only once on *J. foetidissima* from the locality of Thermessos National Park where the latter species grows as a dominant tree. It is important to highlight that the area of Antalya is the most favourable place for growth of both species compared to other areas. The number of collected samples of *A. juniperina* was 28 that 20 of them were collected on *J. excelsa* and 8 of them collected on *J. foetidissima*, while of *P. demidoffii* it was 26 that 17 of them were collected on *J. excelsa* and 9 of them collected on *foetidissima*. The reason is that in this area the juniper forest is very old (between 300-600 years); in some parts it is protected (Çıglıkara forest and Thermessos National Park). The juniper forest is pure and not so mixed with cedar as in Çıglıkara forest (Sevindik district), where the greatest number of the specimens were collected.

In the area of Balıkesir, *A. juniperina* and *P. demidoffii* were collected only on *J. foetidissima*. In this area the juniper forest consists only of *J. foetidissima* mixed mainly with broadleaved elements. There is a some protected area from Balıkesir (Kazdağı), *Juniper* forest was damaged by the villagers many years ago. For this reason we did not collect enough material on *Juniper* trees. The number of *A. juniperina* was 9, while of *P. demidoffii* it was 10.

In the area of Kahramanmaraş, *A. juniperina* and *P. demidoffii* were collected mainly on *J. foetidissima*. *A. juniperina* was collected on *J. excelsa* only once from the locality of Andırın (Elmadag, Mercimeklik district), where this species grows in mixed forest with *J. foetidissima*, *J. drupacea*, *A. cilicica* and *Cedrus libani*. On the locality on the way from Göksun (10 km before Saimbeyli) to Saimbeyli there is a clear and old *J. foetidissima* forest that is very damaged and a very small number of species were registered. The number of collected species of *A. juniperina* is 3 and the number of collected species of *P. demidoffii* is 4.

Table 1. Number of collected specimens of *Antrodia juniperina* and *Pyrofomes demidoffii* in different areas.

Areas	<i>Antrodia juniperina</i>			<i>Pyrofomes demidoffii</i>		
	<i>J. excelsa</i>	<i>J. foetidissima</i>	Total	<i>J. excelsa</i>	<i>J. foetidissima</i>	Total
Adana	9	–	9	14	2	16
Amasya	10	–	10	4	–	4
Antalya	20	8	28	17	9	26
Balıkesir	–	9	9	–	10	10
Kahramanmaraş	1	2	3	–	4	4
Karaman	1	/	1	1	–	1
Konya	–	–	–	3	1	4
Kütahya	–	3	3	–	–	–
Mersin	2	–	2	21	–	21
Muğla	5	–	5	7	–	7
TOTAL	48	22	70	67	26	93

In the area of Karaman, both species were collected on *J. excelsa* only on one locality in Sarıveliler (Civandere district), in mixed forest with *J. oxycedrus* and *Q. cerris*. This forest is very damaged and on a very high altitude (1,750 m).

In the area of Konya only *P. demidoffii* was collected while *A. juniperina* is not yet registered. This species is not rare and grows exclusively on *J. excelsa* in same places in mixed forest with *J. foetidissima* (a total of 4 specimens).

In the area of Kütahya, only *A. juniperina* was collected. This species is rare and was collected only 3 times on *J. foetidissima* in mixed forest with *J. excelsa*, *J. oxycedrus* and *Q. cerris*.

In the area of Mersin, *A. juniperina* and *P. demidoffii* were collected only on *J. excelsa*. According to Işıloğlu and Watling 1992, *P. demidoffii* was collected once on *Juniperus* sp. in mixed conifer forest. Our research demonstrated that *P. demidoffii* is very common (21 samples) in the locality of Mut (Dağpazarı Village) in a clear forest of *J. excelsa*. On the other hand *A. juniperina* is very rare in this area (only three samples).

In the area of Muğla, *P. demidoffii* (a total of 7 specimens) was collected only on *J. excelsa*, while *A. juniperina* (a total of 5 specimens) was collected only on *J. foetidissima*. In this area juniper trees grow together with Mediterranean shrubs (*Q. coccifera*, *P. latifolia*, *J. oxycedrus*). The area of Fethiye (Babadağ) is protected and the distribution of juniper trees is very restricted.

DISCUSSION AND CONCLUSIONS

In general terms, the distribution of *Antrodia juniperina* and *Pyrofomes demidoffii* in the world is not investigated sufficiently. *A. juniperina* is known in East Africa (Ethiopia, Kenya and Tanzania) as a parasite and saprobe on thick trunks of *Juniperus procera* (Niemela & Ryvardeen, 1975). In the USA it grows on

J. deppeana, *J. monosperma*, *J. osteosperma* and *J. virginiana* (Gilbertson & Ryvarden, 1986), and in Europe only in Spain on *J. thurifera* (Garcia-Manjon & Moreno, 1981 ; Julich, 1984), on *J. excelsa* in Bulgaria (Ryvarden & Gilbertson, 1993), and in the Balkans (Karadelev, 1995, 2000, 2001) as a saprobe, rarely as a parasite on old trunks of *J. excelsa* and *J. foetidissima*.

P. demidoffii is a dangerous parasite on various *Juniperus* spp. in East Africa (Ryvarden & Johansen, 1980) and is also frequent on species of this genus in North America (Gilbertson & Ryvarden, 1987). Bondartsev (1971) mentions its finds in Caucasus, Uzbekistan, Siberia, Crimea, mostly on *Juniperus* spp., but also on *Cupressus* and *Pinus*. He considered it to be a subtropical species. Ryvarden (1991) made a map of the world distribution of *P. demidoffii*. It also occurs in Bulgaria on *J. excelsa* (Ryvarden & Gilbertson, 1993). Karadelev (1995, 1998, 2000, 2001) recorded that this species is particularly frequent on old trunks of Greek juniper in the Balkans, and causes considerable damage to Juniper associations.

As seen on the Table 1, The number of registered species of *Pyrofomes demidoffii* was 93 and of *Antrodia juniperina* 70, or totally 163. The majority of specimens were collected on *J. excelsa* (*Antrodia juniperina* – 48, and *Pyrofomes demidoffii* – 67) i.e. totally 115, and on *J. foetidissima* (*Antrodia juniperina* – 22, and *Pyrofomes demidoffii* – 26) i.e. totally 48.

The distributions of specimens of *A. juniperina* and *P. demidoffii* for the locality of Turkey are Antalya (a total of 54 specimens), Adana (a total of 25 specimens), Mersin (a total of 23 specimens), Balıkesir (a total of 19 specimens), Amasya (a total of 14 specimens), Muğla (a total of 13 specimens), Kahramanmaraş (a total of 7 specimens), Konya (a total of 4 specimens), Kütahya (a total of 3 specimens) and Karaman (a total of 2 specimens), respectively.

The Antalya region is the best place for the growth of *A. juniperina* and *P. demidoffii* compared to other areas. In this area, *J. excelsa* and *J. foetidissima* forests were protected before 25 years and every harmful applications (cutting the trees) were forbidden. Besides the forests in this area are very old and healthy.

J. excelsa forest is most common from the regions of Adana and Mersin which are close each other than *J. foetidissima*. *A. juniperina* and *P. demidoffii* were identified only on *J. excelsa* while 2 specimens for *P. demidoffii* were identified on *J. foetidissima*.

All specimens of *A. juniperina* and *P. demidoffii* identified from the Balıkesir area were collected only on *J. foetidissima*, on the contrary to Balıkesir area, both species were collected on *J. excelsa* from Amasya and Muğla areas. Except from only one locality in Kahramanmaraş, all specimens of *A. juniperina* and *P. demidoffii* were collected on *J. foetidissima*. *A. juniperina* could not be collected from Konya area while *P. demidoffii* could not be collected from Kütahya area.

As an overall conclusion, it may be underscored that *Pyrofomes demidoffii* is more common on *J. excelsa* than *Antrodia juniperina*.

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REFERENCES

- BONDARTSEV A.S., 1971 — *The Polyporaceae of the European USSR and Caucasia*. Jerusalem, 896 p.
- GARCIA-MANJON J.L. & MORENO G., 1981 — Estudios sobre Aphyllophorales I. Fructificaciones sobre *Juniperus*. *Anales del Jardín Botánico de Madrid* 37(2) : 407-416.
- GILBERTSON R. & RYVARDEN L., 1986-1987 — *North American Polypores* (Part 1-2). Fungiflora. Oslo, 885 p.
- IŞILOĞLU M. & WATLING R., 1992 — Macromycetes of Mediterranean Turkey. *Edinburgh Journal of Botany* 49(1) : 99-121.
- JULICH W., 1984 — *Die Nichtblätterpilze, Gallertpilze und Bauchpilze, n Kleine Kryptogamenflora II b/1*. Gustav Fischer Verlag, Stuttgart, 626 p.
- KARADELEV M., 1995 — Lignicolous Aphyllophorales on Greek juniper (*Juniperus excelsa*) in the Republic of Macedonia. *Mycotaxon* 56 : 467-472.
- KARADELEV M., 1998 — Fungal biodiversity in Macedonia I. with a special regard to substrates with a disjunctive range and relict origin. *Mycologia Montenegrina* 1-n: 49-55.
- KARADELEV M., 2000 — Lignicolous Aphyllophorales parasites and saprophytes on Greek juniper (*Juniperus excelsa* M.Bieb.) In the Balkan Peninsula. Proceedings of the International Symposium. *Problems of Juniper Forests and Looking for Solutions, Methods, Techniques*. Osh, Kyrgyzstan, 161-165.
- KARADELEV M., 2001 — Distribution of lignicolous macromycetes, parasites and saprophytes on *Juniperus* spp. (*J. excelsa*, *J. foetidissima*, *J. sabina*, *J. communis* & *J. oxycedrus*) in the Balkan Peninsula. *Deuxième Colloque International "Le Genévrier thurifère et les forêts d'altitude dans les Montagnes du pourtour Méditerranéen"*. Marrakech. Morocco, 125-131.
- NIEMELÄ T. & RYVARDEN L., 1975 — Studies in the Aphyllophorales of Africa IV: *Antrodia juniperina* new for East Africa. *Transactions of the British Mycological Society* 65(2) : 427-432.
- RYVARDEN L. & GILBERTSON R., 1993 — *European Polypores* (Part 1-2). Fungiflora. Oslo, 743 p.
- RYVARDEN L. & JOHANSEN I., 1980 — *A Preliminary Polypore Flora of East Africa*. Fungiflora. Oslo, 636 p.
- RYVARDEN L., 1991 — *Genera of Polypores*. Nomenclature and Taxonomy. Synopsis Fungorum 5. Fungiflora. Oslo, 1-363.
- SELIK M. 1973 — Türkiye Odunsu Bitkileri Özellikle Orman Ağaçlarında Hastalık Amili ve Odun Tahrir Eden Mantarlar. *İstanbul Üniv. Orman Fak. Yayınlar*. İstanbul, 199: 1-55.