

New records for anamorphic fungi of Guilan province, Iran

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Abstract: This study was carried out to continue identifying unknown and less known anamorphic fungi from Guilan province. Plant materials with fungal signs and symptoms were collected and examined to identify causal agents. Four species *viz.* *Alternaria calendulae* (on *Calendula officinalis*), *Pseudocercospora sordida* (on *Campsis* sp.), *Thecogonia ligustrina* (on *Ligustrum vulgare*) and *Zygosporium oscheoides* (on decaying leaves of *Bilbergia* sp., *Monstera deliciosa*, and stem of *Asparagus* sp.) are reported as new to Iranian mycobiota.

Key words: mitosporic fungi, *Pseudocercospora*, *Alternaria*, *Zygosporium*

INTRODUCTION

Guilan, a province in the north of Iran, is located along the Caspian Sea between 36° 34' to 38° 27'N latitude and 48° 53' to 50° 34'E longitude. This region is separated from other parts of Iran by the Alborz mountain range. Guilan has a humid temperate and Mediterranean climate with abundant annual rainfall. Maximum rainfall recorded from Guilan province, was 1590.60 mm for the year 2007 (Anonymous 2008). Attention to biodiversity of the fungi of Guilan province has particularly increased in the last decade, so that some records have been provided on this subject and some of them like this project are still in progress (Khodaparast 2006, Khodaparast & Braun 2005, Khodaparast et al. 2008, Hashemi Babaheydari & Khodaparast 2006, Hashemi Babaheydari et al. 2007, Gharizadeh et al. 2004a, b, Zahedi et al. 2011). Although there are many non-identified taxonomic groups, efforts are taken to increase the information for this region.

This paper follows the previous publications (Khodaparast et al. 2008, 2012, Zahedi et al. 2011) on anamorphic fungi from Guilan province, Iran.

MATERIALS AND METHODS

Plant materials with fungal signs and symptoms were collected from Rasht (Guilan province) during 2011. Fungal structures were mounted in 50% Lactic acid and examined using a BH2 Olympus microscope equipped with a Sony digital camera (DSC-HX1). Measurements were taken in 50% Lactic acid, based on 20-30 conidiophores, conidia, and other fungal structures. For photography, usually more than one photograph was taken for each specimen and selected photos were merged together and arranged into a single photo for each specimen in Photoshop (Ver. CS3). Identification of taxa is based on the keys and descriptions of Chupp (1954), Crous & Braun (2003), Deighton (1976), Ellis (1971, 1976), Simmons (2007) and Whitton et al. (2003).

All names checked with MycoBank (<http://www.mycobank.org>) and nomenclature follows this online database (Crous et al. 2004). For each species descriptions, photographs of the conidiophores and conidia are provided. All collected specimens are deposited in the fungal collection of the Department of Plant Protection, Faculty of Agriculture, University of Guilan. Reference numbers are presented in parentheses after collector's name.

RESULTS AND DISCUSSION

In this paper four species including *Alternaria calendulae*, *Pseudocercospora sordida*, *Thecogonia ligustrina* and *Zygosporium oscheoides* are newly reported from Iran.

***Alternaria calendulae* Ondrej, Cas. Slezsk. Mus. Opave 23(2): 150 (1974)**

Early developing spots are water soaked, finally numerous brown to purple circular spots, up to 1 cm, were developed on infected leaves. Conidiophores are simple or in groups, septate, brown, 85–210 × 8–11 μm (Fig 1C). Conidia long ellipsoid to broadly ellipsoid, with one beak extension, light to tawny brown, 70–155 × 20–25 μm, with 8–12 transverse and 1–4 longitudinal septa (Fig 1A-B). The apical beaks 50–165 μm long and taper from base to apex.

Specimen examined: on *Calendula officinalis* L., Guilan, Rasht, Feb. 22, 2011, V. Taheriyani (933).

***Pseudocercospora sordida* (Sacc.) Deighton, Mycological Papers 140: 153 (1976)**

Leaf spot subcircular, irregular to angular, confluent or vein-limited, 2–6 mm diameter, brown, greyish-brown to olivaceous-brown on the lower surface. Fruiting hypogenous, spreading out loosely. Stromata absent or rudimentary. Conidiophores in fascicle, including about 5–15 stalks, emerging through stomata, uniform in colour, conspicuously irregular in width, straight to curved, simple or sometime with 1–2(-3) branches, undulate, geniculate, with 1–9 septa, conidial scars inconspicuous, $25\text{--}65 \times 4\text{--}7\ \mu\text{m}$ (Fig 2C). Conidia obclavate, obclavate-subcylindrical to subcylindrical, sometime filiform, subhyaline to pale olivaceous-brown, with two distinct guttule formed around septa, flexible, straight to curved, usually blunt at the apex, basal cell obconic, truncate to subcylindrical, 2–15 septa, very variable in length, $20\text{--}165 \times 3\text{--}5\ \mu\text{m}$ (Fig 2A-B).

Specimen examined: on *Campsis* sp. Guilan, Rasht, Nov. 11, 2011. V. Taheriyani (928).

***Thedgonia ligustrina* (Boerema) B. Sutton, Trans. Br. Mycol. Soc. 61: 428 (1973)**

Leaf spot circular to subcircular, up to 5 mm diameter, pale brown to greyish, with purplish margin. Fruiting amphigenous, mostly hypophyllous, conspicuous, cover whole under side of leaf, with abundant conidia, grey to greyish-brown.

Conidiophores in more or less dense fascicles, arising from stomata (Fig 3A), simple, rarely branched, subcylindrical, straight to geniculate, aseptate to septate, smooth, light brown to pale yellowish at lower part, becoming pale brown to hyaline toward the apex, $18\text{--}75 \times 5\text{--}7.5\ \mu\text{m}$, conidiogenous cell sympodial, with unthickened conidial scars (Fig 3B), conidia produced in disarticulating chains, hyaline or very pale olivaceous-brown, mostly subcylindric, sometimes nearly obclavate and even to irregular, straight to curved, apex rounded, or truncate, with 0–5 septa, truncate at base, $25\text{--}84\text{--}(120) \times 4\text{--}6\ \mu\text{m}$, hila unthickened, inconspicuous, colorless (Fig 3C-D).

Specimen examined: on *Ligustrum vulgare*, Guilan, Rasht, Nov. 11, 2011. V. Taheriyani (939).



Fig. 1. *Alternaria calendulae*: A. - B. Conidia and C. Conidiophores, scale bar = 50 μm . Specimen examined: on *Calendula officinalis* L., Guilan, Rasht, Feb. 22, 2011, V. Taheriyani (933).

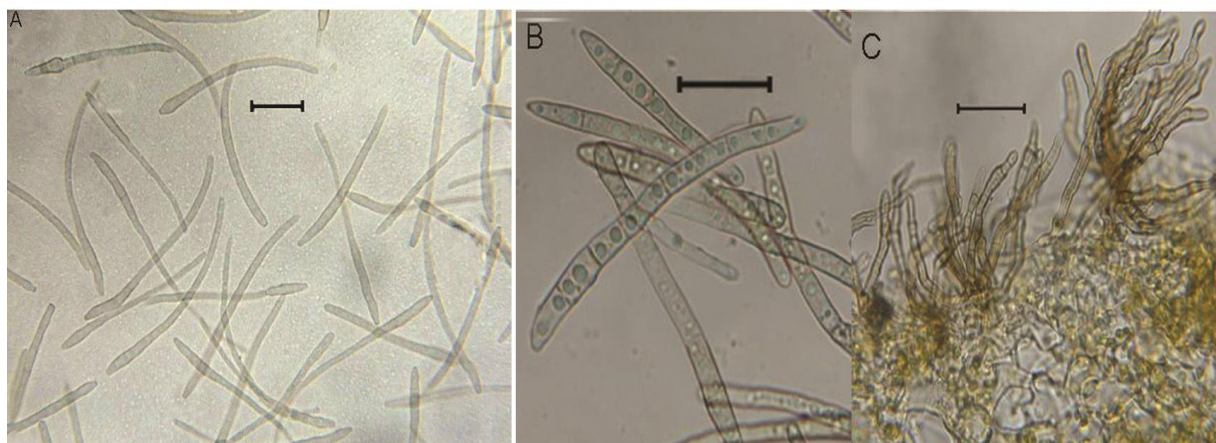


Fig. 2. *Pseudocercospora sordida*: A and B. conidia, C. Conidiophores, scale bar = 20 μm . Specimen examined: on *Campsis* sp. Guilan, Rasht, Nov. 11, 2011. V. Taheriyani (928).



Fig. 3. *Theclonia ligustrina*: **A** and **B**, conidiophores, **C** and **D**, conidia, scale bars = 20 µm. Specimen examined: on *Ligustrum vulgare*, Guilan, Rasht, Nov. 11, 2011. V. Taheriyani (939).

***Zygosporium oscheoides* Mont. Annales des Sciences Naturelles, Botanique 17: 121 (1842)**

Colony dark on host tissue. Conidia one-celled, nearly oval to ellipsoid, hyaline to pale-brown, smooth to minutely verruculose, $5\text{--}12 \times 5\text{--}8$ µm (Fig 4E). Two types of conidiophores have been described for the fungus. Setiform conidiophores pigmented, (31)37–58(–60) µm long (Fig. 4B), apical cell subhyaline, acute or narrowly clavate (Fig. 4C). Vesicular conidiophores always produced from the side of the setiform conidiophores, 3–4-celled, often curved, dark pigmented (except the first cell that it was hyaline), $12\text{--}17 \times 5\text{--}8$ µm (Fig. 4A). Conidiogenous cells 2–3 (mostly 2) per vesicle (Fig. 4D). Based on these data, the fungus was identified as *Zygosporium*

oscheoides Mont. (Ellis 1971; Whitton et al. 2003). *Z. oscheoides* is type species and the commonest species of *Zygosporium* (Ellis 1971) has been reported on many substrates from numerous parts of the world. Species of the genus are saprophyte and were reported from dead or decaying plant parts. *Z. gibbum* (Sacc. & Bomm.) Hughes is already reported from Iran (Ershad 2009) and *Z. oscheoides* is the second species of the genus being reported from Iran.

Specimens examined: on decaying leaves of *Bilbergia* sp. (940), *Monstera deliciosa* (936) and stem of *Asparagus* sp. (941), all collected from greenhouse of Department of Horticulture, Faculty of Agriculture, University of Guilan, Rasht, Iran. 16 Dec. 2011. V. Taherian & S.A. Hashemi.



Fig.4. *Zygosporium oscheoides*: **A**, Vesicular conidiophores, **B**, Setiform conidiophores, **C**, Clavate apical cell on setiform conidiophores, **D**, Young conidia producing on vesicular conidiophores, **E**, Conidia. Scale bar = 20 µm.

REFERENCES

- Anonymous. 2008. Meteorological Year Book 2007. Ministry of Road and Transportation, I. R. of Iran, Meteorological Organization (IRIMO), Tehran, Iran.
- Chupp C. 1954. A monograph of the fungus genus *Cercospora*. Published by the author, Ithaca, New York.
- Crous PW, Gams W, Stalpers JA, Robert V and Stegehuis G. 2004. MycoBank: an online initiative to launch mycology into the 21st century. *Studies in Mycology* 50: 19–22.
- Crous PW & Braun U. 2003. *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*. Centraalbureau voor Schimmelcultures, Utrecht, The Netherlands.
- Deighton FC. 1976. Studies on *Cercospora* and allied genera. VI. *Pseudocercospora* Speg., *Pantospora* Cif., and *Cercoseptoria* Petr. *Mycol. Pap.* 140: 1-168.
- Ellis MB. 1971. Dematiaceous Hyphomycetes. Commonwealth Mycological Institute. Kew, UK.
- Ellis, MB. 1976. More dematiaceous Hyphomycetes. Commonwealth Mycological Institute. Kew, UK.
- Ershad D. 2009. Fungi of Iran. 3rd ed. Iranian Research Institute of Plant Protection, Tehran, Iran.
- Gharizadeh Kh, Khodaparast SA, Abbasi M. & Elahinia S.A. 2004a. A study on the identification of wood-inhabiting Hyphomycetes in Guilan province (II). *Rostaniha* 5: 123-145.
- Gharizadeh, Kh, Khodaparast SA, Elahinia SA & Abbasi M. 2004b. A study on the identification of wood-inhabiting Hyphomycetes in Guilan province, Iran (I). *Rostaniha* 5: 19-24.
- Hashemi Babaheydari SA & Khodaparast SA. 2006. *Foveostroma drupacearum*, a new species for Iranian mycoflora from dead cherry twigs. *Rostaniha* 7: 163-164.
- Hashemi Babaheydari SA, Khodaparast SA & Banihashemi SZ. 2007. Identification of *Monilinia* species, the causal agent of pome and stone fruits brown rot in Guilan province. *Iranian Journal of Plant Pathology* 43: 312-324.
- Khodaparast SA, Zahedi M, Amirmijani A, Salimi M. 2012. New reports on mitosporic fungi from the Caspian Sea area (N Iran). *Rostaniha* 13: 31-37.
- Khodaparast SA. 2006. A survey on citrus sooty mold fungi in Guilan province, Iran. *Rostaniha* 7: 59-65.
- Khodaparast SA & Braun U. 2005. *Ramularia uredinicola*: a new species from Iran. *Mycotaxon* 91: 357-359.
- Khodaparast SA, Salimi M, Ahmadi SB & Mehri Z. 2008. Eight new or less known mitosporic fungi for Iran mycoflora from Guilan Province. *Rostaniha* 9: 89-99.
- Simmons E G. 2007. *Alternaria*: an identification manual. CBS Fungal Biodiversity Centre, Utrecht, The Netherlands.
- Whitton SR, McKenzie EHC & Hyde KD. 2003. Microfungi on Pandanaceae: *Zygosporium*, a review of the genus and two new species. *Fungal Diversity* 12: 207-222.
- Zahedi M, Elahinia SA, Khodaparast SA & Boujari J. 2011. Introduction of some new mitosporic fungi causing leaf spot on broad leaf trees in Guilan province, Iran. *Rostaniha* 12: 63-71.

گزارش های جدید از قارچ های آنامورفیک استان گیلان

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چکیده: این تحقیق در ادامه مطالعه قارچ های آنامورفیک ناشناخته یا در حال مطالعه در استان گیلان انجام شده است. نمونه های گیاهی با نشانه های آلودگی و اندام های قارچی جمع آوری و برای شناسایی عوامل آلودگی مورد بررسی قرار گرفتند. چهار گونه شامل *Alternaria calendulae* (از روی *Calendula officinalis*)، *Pseudocercospora sordida* (از روی *Campsis* sp.)، *Thectonia ligustrina* (از روی *Ligustrum vulgare*) و *Zygosporium oscheoides* (از روی برگ های در حال پوسیدن *Bilbergia* sp. و *Monstera deliciosa* و از روی ساقه *Asparagus* sp.) برای اولین بار برای میکوبیوتای ایران گزارش می شوند.

واژه های کلیدی: قارچ های آنامورفیک، *Zygosporium*، *Alternaria*، *Pseudocercospora*