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OZASLAN, C.^{1*}
HÜSEYİN, E.²
FAROOQ, S.³
ONEN, H.⁴

* Corresponding author:
<cumaliz@yahoo.com>

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NEW RECORDS OF MICROFUNGI AND CHROMISTA FROM ANATOLIAN PENINSULA OF TURKEY

Novos Registros de Fungos da Península Anatólica da Turquia

ABSTRACT - This article presents new records of fungi and downy mildews in Turkey on different weeds of agrophytocoenosis. These records include *Plectosphaerella alismatis* (Oudem.) A.J.L. Phillips, Carlucci & M.L. Raimondo (on *Alisma plantago-aquatica* L.), *Pyricularia grisea* Sacc. (on *Setaria viridis* (L.) P. Beauv.), *Phakopsora artemisiae* Hirats. (on *Artemisia dracuncululus* L.), *Puccinia rubefaciens* Johanson (on *Galium* sp.), *Ustilago trichophora* (Link) Kunze (on *Echinochloa crus-galli* (L.) P. Beauv.), *Peronospora astragalina* Syd. (on *Astragalus homosus* L.) and *P. myagri* Mayor (on *Myagrum perfoliatum* L.). *Plectosphaerella* and *Phakopsora* as generic level and others as species are new records from Turkey. Description and illustrations of the identified fungi are presented, which all are based on Turkish specimens. The identified fungi could be potential biological control agents; however, detailed studies are needed in this regard.

Keywords: Ascomycota, Basidiomycota, Oomycota, taxonomy, weeds, Turkey.

RESUMO - Este artigo apresenta novos registros de fungos na Turquia sobre diferentes plantas daninhas da agrofitocenose. Esses registros incluem *Plectosphaerella alismatis* (Oudem.) A.J.L. Phillips, Carlucci e M.L. Raimondo (em *Alisma plantago-aquatica* L.), *Pyricularia grisea* Sacc. (em *Setaria viridis* (L.) P. Beauv.), *Phakopsora artemisiae* Hirats. (em *Artemisia dracuncululus* L.), *Puccinia rubefaciens* Johanson (em *Galium* sp.), *Ustilago trichophora* (Link) Kunze (em *Echinochloa crus-galli* (L.) P. Beauv.), *Peronospora astragalina* Syd. (em *Astragalus homosus* L.) e *P. myagri* Mayor (em *Myagrum perfoliatum* L.). *Plectosphaerella* e *Phakopsora* como nível genérico e outros como espécies, originando novos registros da Turquia. A descrição e a ilustração dos fungos identificados são apresentadas, sendo todos baseados em espécimes turcos. Os fungos identificados podem ser potenciais agentes de controle biológico, porém estudos detalhados são necessários nesse sentido.

Palavras-chave: Ascomycota, Basidiomycota, Oomycota, taxonomia, plantas daninhas, Turquia.

INTRODUCTION

Weeds are the major handicaps in agricultural ecosystems which decrease crop productivity and incur massive management costs (Zimdahl, 2013). The occurrence of phytopathogenic fungi and other microorganisms on weed species are important because of increasing interest in biological control. Moreover, increasing cases of herbicide resistant weeds and undue interventions of

¹ Dicle University, Faculty of Agriculture, Diyarbakir, Turkey; ² Ahi Evran University, Sciences and Arts Faculty, Kirsehir, Turkey; ³ Department of Plant Protection, Harran University, Sanliurfa, Turkey; ⁴ Gaziosmanpasa University, Faculty of Agriculture, Tokat, Turkey.

herbicides in cultural ecosystems have made it inevitable to find reliable, alternative weed management approaches. The use of microorganisms in classical biological control of different weed species has increased since last decades. Some of these fungi and other microorganisms are potential biological control agents of these weed species (Kiss, 2003; Rector et al., 2006). There are some reports from Turkey denoting the presence of fungal plant pathogens on different weed species (Göbelez, 1963,1964; Ercis and Iren, 1993; Tepe and Özrenk, 1999; Bahcecioglu and Gjaerum, 2003; Kavak, 2003; Sert and Sümbül, 2003; Kirbag, 2004; Sert, 2009; Tunali et al., 2009; Erdogdu et al., 2010; Ekici et al., 2012; Erdogdu and Hüseyin, 2013; Özaskan et al., 2013; Kavak and Bilgili, 2015; Özaskan et al., 2015). Therefore, determination, identification and reporting of new occurrence records of fungal pathogens and other microorganisms are of great importance. These reports assist ecologists, mycologists and weed scientists to assess the biogeography and ecology of hosts and pathogens (Dugan and Glawe, 2007). Moreover, these reports are of prime importance for development of biological control programs against different weed species present in a particular region. Therefore, we have been aimed at determining the new fungal and Chromista pathogens on different weed species prevailing in different provinces of Turkey in this study.

MATERIALS AND METHODS

Samples of the fungi were collected from various weed species during periodical mycological surveys conducted in different localities of Turkey, through 2012 to 2015. Microscopic studies were carried out on slides prepared in distilled water. Photomicrographs were captured by means of Olympus BX 53 research microscope supplied with Olympus DP 22 digi-CAM (Japan) and Axio imager 2 equipped with Nomarski differential interference contrast optics. The fungi were identified using the handbooks and other publications (Shvartsman, 1960; Mayor, 1962; Uljanishchev, 1968; Shvartsman, 1973; Kuprevich, 1975; Uljanishchev, 1978; Ellis and Ellis, 1985; Uljanishchev et al., 1985; Mordue, 1995; Braun, 1998; Azbukina, 2005; Vánky, 2012) by examining the lesions formed in the plant tissue, conidial structure, conidioforun branching, conidium structure, conidium shape, color and size of resting organ. The host weed species' specimens were prepared according to established herbarium techniques. The host weed species were identified using the "Flora of Turkey and East Aegean Islands" (Davis, 1965-1985). Taxa, families, and author citations were spelled according to Kirk and Ansell (1993), and Fungorum (2016). All specimens have been deposited in the Mycological Collection of Dicle University, Diyarbakir (Faculty of Agriculture, Department of Plant Protection).

RESULTS AND DISCUSSION

Systematic status of the recorded taxa belonging to Ascomycota, Basidiomycota and Chromista, and their description, photos of symptoms, and photomicrographs based on Turkish samples are provided below.

Fungi

Ascomycota Caval.-Sm.

Plectosphaerellaceae W. Gams, Summerb. & Zare

Plectosphaerella alismatis (Oudem.) A.J.L. Phillips, Carlucci & M.L. Raimondo. Carlucci et al., 2012: 39.

[Syn. *Septoria alismatis* Oudem., *Arch. néerl. Sci.* 8:346 (1873); *Ascochyta alismatis* (Oudem.) Trail, *Scott. Natural.*, N.S. 3 ('9):188 (1887); *Rhynchosporium alismatis* (Oudem.) Davis, *Trans. Wis. Acad. Sci. Arts Lett.* 20:420 (1922); *Didymaria alismatis* (Oudem.) Davis, *Parasitic Fungi of Wisconsin:* 103 (1942); *Spermosporina alismatis* (Oudem.) U. Braun, *Cryptog. bot.* 4(1): 111 (1993); *Plectosporium alismatis* (Oudem.) W.M. Pitt, W. Gams & U. Braun, in Pitt, Goodwin, Ash, Cother & Cother, *Mycol. Res.* 108 (7):779 (2004)] (Figure 1).

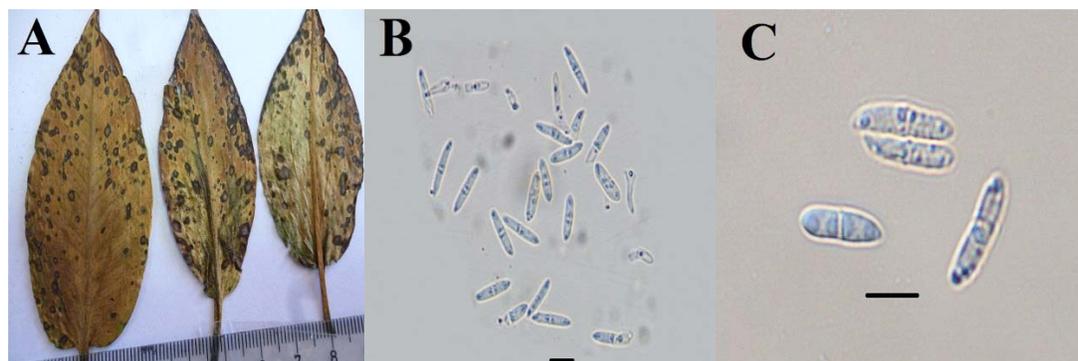


Figure 1 - *Plectosphaerella alismatis*. A: Symptoms. B-C: Conidia. Bars: B-C 10 μ m.

Leaf spots numerous, amphigenous, subcircular to somewhat angular-irregular, 0.5-5 mm diam., brown, later center pale, often confluent, numerous at the edges. Colonies amphigenous, effuse, greyish white. Conidia solitary, narrow-ellipsoid, subclavate, fusiform, 15-20 x 2-3 (-4.5) μ m, 0-2-septate, mostly 1-septate, rarely slightly constricted at the septa, hyaline, smooth, apex acuminate or rounded, base rounded or usually somewhat attenuated.

Specimen examined: In paddy field, on the living leaves of *Alisma plantago-aquatica* L. (Alismataceae), Turkey, Siirt Province, Karaca Village, 38°07'09" N, 42°01'59" E, 1300 m, September 18, 2014. CÖ 201405.

Specimen of *P. alismatis* from Turkey has conidia similar in size to those described by Carlucci et al. (2012), where conidia are 13-19.5 x 2.5-3 μ m, mostly septate.

Pyriculariaceae Klaubauf, Lebrun & Crous

***Pyricularia grisea* Cooke ex Sacc.**

Saccardo 1886:217.

[Syn. *Trichothecium griseum* Cooke, in Ravenel, *Amer. Fungi*: no. 580 (1882); *Dactylaria grisea* (Sacc.) Shirai, in Miyake, *J. Coll. Agric. imp. Univ. Tokyo* 2:262 (1910); *Ceratosphaeria grisea* T.T. Hebert, *Phytopathology* 61(1):86 (1971); *Magnaporthe grisea* (T.T. Hebert) M.E. Barr, *Mycologia* 69(5):954 (1977); *Phragmoporthes grisea* (T.T. Hebert) M. Monod, *Beih. Sydowia* 9: 153 (1983)]. Anamorphic *Magnaporthe* R.A. Krause & R.K. Webster (Figure 2).

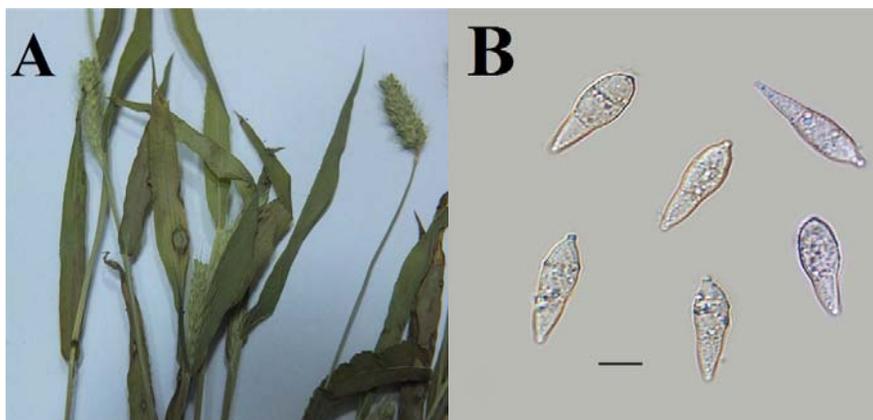


Figure 2 - *Pyricularia grisea*. A: Symptoms. B: Conidia. Bars: B 15 μ m.

Leaf spots round or oblong, 0.5-2.5 cm across, whitish, light gray with a reddish-brown border, confluent. Caespituli hypophyllous, grey, single or in loose bundles. Conidiophores simple, septate, tapering at the top, sinuate, 75-85 x 4-4.5 μ m. Conidia gray, obclavate or pyriform, base acuminate, 2-3-septate, mostly 2-septate, (20-) 22-25 (-27) x 7.5-10 μ m.

Specimen examined: In vegetable field tomato garden, on the living leaves of *Setaria viridis* (L.) P. Beauv. (Poaceae), Turkey, Istanbul Province, Halkali, 41°01'54" N, 28°46'45" E, 95 m, August 12, 2013. CÖ 201319.

Conidia of *P. grisea* recorded from Turkey have mostly 2 septa, (20-)22 - 25(-27) x 7.5-10 µm. The size of our samples differs from the type material by their larger conidia and number of septa, the conidia of type specimen have 3 septa, 18 x 9 µm (Saccardo, 1886). According to Shvartsman et al. (1973) conidia 18-22 x 7-9 µm, 2-3-septate, which is slightly smaller than those found in the Turkish specimen.

Basidiomycota R.T. Moore

Phakopsoraceae Cummins & Hirats. f.

***Phakopsora artemisiae* Hirats. f.**

Mundkur (1943).

[Syn. *Phytopella artemisiae* (Hirats.f.) Azbukina, *Nov. Sist. Niz. Rast.* 7:227 (1970)] (Figure 3).

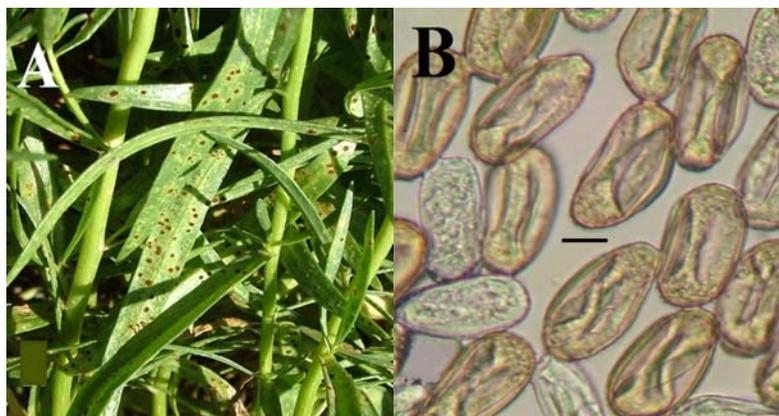


Figure 3 - *Phakopsora artemisiae*. A: Symptoms. B: Teliospores. Bars: B 10 µm.

Pycnia and aecia unknown. Uredinia amphigenous, scattered or in small group, rounded, yellow, at first covered by epidermis, later rupturing with a central pore. Paraphyses numerous, capitate, capitate-clavate, hyaline, 35-40 µm long. Urediniospores globose, ellipsoid, ovoid or obovoid, 22-40 x 18-22 µm; wall hyaline, minutely shortly echinulate, 1.5 µm thick. Telia amphigenous, occasionally hypophyllous, scattered or in groups, yellowish-brown or brown, 0.2-0.5 mm diam. Teliospores in chains, lenticular, 28-35 x 14-17 µm; wall yellow or brown, 1.2-1.5 µm thick, of the terminal teliospores apex thickened up to 3.5-4.0 µm.

Specimen examined: In vegetable field tarragon garden, on the living leaves of *Artemisia dracunculus* L. (Asteraceae), Turkey, Sanliurfa Province, 37°13'02" N, 38°57'14" E, 570 m, July 10, 2012. CÖ 201224.

P. artemisiae from Japan has urediniospores 23.4-38 x 16-25 µm and teliospores 19-33 x 13-18 µm (Hiratsuka et al., 1992). The specimen of this species collected and identified from Turkey has a little long teliospores (28-35 x 14-17 µm).

Pucciniaceae Chevall.

***Puccinia rubefaciens* Johanson**

Saccardo 1888: 680.

[Syn. *Dicaeoma rhytismodes* (Johanson) Kuntze, *Revis. gen. pl.* (Leipzig) 3(2):470 (1898); *D. rubefaciens* (Johanson) Kuntze, *Revis. gen. pl.* (Leipzig) 3 (2):470 (1898); *Micropuccinia rubefaciens*

(Johanson) Arthur & H.S. Jacks., *Bull. Torrey bot. Club* 48:41 (1921); *Leptopuccinia rubefaciens* (Johanson) Syd., *Annls mycol.* 20 (3/4):121 (1922)] (Figure 4).



Figure 4 - *Puccinia rubefaciens*. A: Symptoms. B: Teliospores. Bars: 15 µm.

Pycnia, aecia and uredinia not seen. Telia on rounded or irregular reddish-purple or yellow spots, hypophyllous, rarely epiphyllous, sometimes on stems and sprouts, scattered, confluent, oblong, 1-3 mm long, blackish-brown or black, Teliospores oblong-clavate or clavate, (35-) 40-50 × (17.5-)20-22(-25) µm, constricted at the septum; wall dark brown, 1.5-2.0 µm thick, apex thickened up to 10 µm, smooth; pedicel hyaline, persistent, 25-30 × 5-6 µm.

Specimen examined: In fallow land, on the living leaves of *Galium* sp. (Rubiaceae), Turkey, Artvin Province, Borçka District, 45°78'11" N, 37°72'85" E, 234 m, November 25, 2013. CÖ 201306

P. rubefaciens from Turkey differ from the type species (Saccardo, 1888:680, teliospores 30-53 × 14-22 µm) and other literature data (Uljanishchev, 1978:251, teliospores 36-53 × 14-22 µm; Azbukina, 2005:366, teliospores 30-50(-53) × 14-22 µm), by slightly shorter and wider teliospores, (35-)40-50 × (17.5-)20-22(-25) µm.

Ustilaginaceae Tul. & C. Tul.

Ustilago trichophora (Link) Kunze

Saccardo 1888: 462

[Syn. *Caeoma trichophorum* Link, in Willdenow, *Sp. pl.*, Edn 4 6(2):3 (1825); (Uredo) *Ustilago trichophora* (Link) Kunze, *Flora*, Regensburg 13:369 (1830); *Ustilago sphaerogena* Burrill, in Berlese, De Toni & Fischer, *Syll. fung.* (Abellini) 7:468 (1888); *Cintractia sphaerogena* (Burrill) H.H. Hume, *Proc. Iowa Acad. Sci.* 9:233 (1902); *Ustilago crus-galli* Tracy & Earle, *Bull. Torrey bot. Club* 22:175 (1895); *Cintractia crus-galli* (Tracy & Earle) P. Magnus, *Ber. dt. bot. Ges.* 14:392 (1896); *Ustilago trichophora* (Link) Kunze var. *crus-galli* (Tracy & Earle) Lavrov, *Trudy Biol. Nauchno- Issl. Inst. Tomsk. Gosud. Univ.* 2:9 (extr.) (1936); *Ustilago panici-frumentacei* Brefeld, *Unters. Gesamtgeb. Mykol.* (Liepzig) 12:103 (1895); *Ustilago trichophora* (Link) Kunze var. *pacifica* Lavrov, *Trudy biologicheskogo Nauchno-Issledovatel'skogo Instituta Tomskogo Gosudarstvennogo Universiteta* 2:9 (extr.) (1936); *Cintractia seymouriana* P. Magnus, *Ber. dt. bot. Ges.* 14:217 (1896); *Ustilago globigena* Spegazzini, *Anal. Mus. nac. Hist. nat. B. Aires* 6:208 (1898) [1899]; *Ustilago holubii* Syd., *Annls mycol.* 33(3/4):230 (1935); *Sphacelotheca almorae* A. Krishna & R. A. Singh, *Indian J. Mycol. Plant Path.* 10(2):177 (1980)] (Figure 5).

Sori forming moniliform bullate bodies on the leaves, inflorescences and stems, 3-30 mm diam. to 10 cm long swellings, covered by a inspid membrane composed of an inner, fungal layer and an outer layer of host origin, with expressly overgrown hairs. After the rupture of membrane powdery dark brown mass of spores is released. Spores light olivaceous-brown, globose, subglobose to ovoid, 7.5-10 × 7-9 µm; wall 1.0-1.5 µm thick, sparsely to moderately densely, minutely verruculose or echinulate.

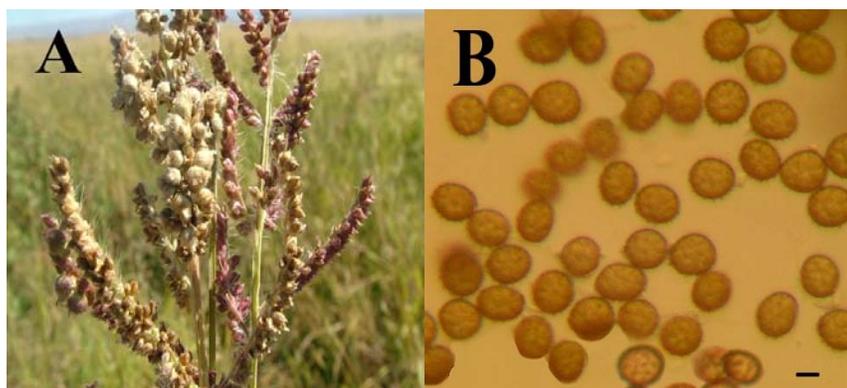


Figure 5 - *Ustilago trichophora*. A: Symptoms. B: Spores. Bars: 10 μm .

Specimen examined: In paddy field, on the living leaves, inflorescences and stems of *Echinochloa crus-galli* (L.) P. Beauv. (Poaceae), Turkey, Sanliurfa Province, Siverek District, 39°59'31" N, 37°70'45" E, 848 m, September 29, 2012. CÖ 201228; Siirt Province, Karacaköy District, 38°07'09" N, 42°01'59" E, 1038 m, October 1, 2012. CÖ 201296.

We measured the spores of *U. trichophora* as 7.5-10 x 7-9 μm . According to Gutner (1941), spores 8 - 14 μm diam.; Savulescu (1957: 574), 9-10 μm diam. or 9-12 x 7-10 μm ; Shvartsman (1960), 7.5-11 x 7.5-10 μm ; Uljanishchev (1968:28), 5.4-10.8 μm diam., and Vánky (2011), spores 6-11 x 7-12 μm . Sizes of spores from Turkey is in the range indicated in the literature.

Chromista

Oomycota Arx

Peronosporaceae de Bary

Peronospora astragalina Syd. (Figure 6)

Saccardo 1972: 31.

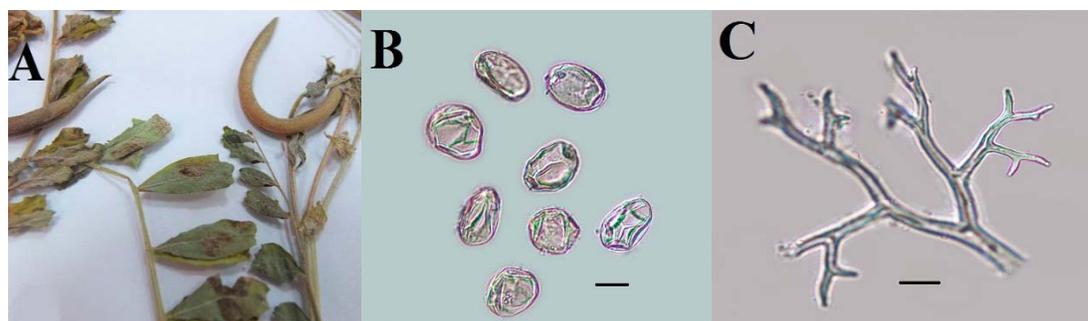


Figure 6 - *Peronospora astragalina*. A: Symptoms. B: Conidia. C: Ultimate branchlets. Bars: B 15 μm ; C 25 μm .

Spots located mainly between the veins, yellowish-brown, irregular, 1.5-2 mm across. Conidial coating on lower, sometimes on the upper surface of leaves, loose, grayish-violet. Conidiophores hypophyllous, solitary or fascicled, 220-420 μm long, slender, colorless; trunk sub straight to slightly curved, 80-210 μm long, 5-11 μm wide below the first branch; branches dichotomously branched in three to six orders, slightly curved, almost straight; ultimate branchlets in pairs, situated at a right angle, unequal, straight to slightly curved, sometimes subulate, (5-)7.5-20(-25) μm long, 1.5-2.0 μm wide at the base, apex acute. Conidia slightly greyish-violet, ellipsoidal, broadly ellipsoidal, broadly rounded, 15-28 x 12-26 μm , mostly 17.5-25 x 15-20 μm , pedicel absent. Resting organs visible as greyish-violet dots on the lower leaf surface; oogonia oval, broadly ellipsoidal, 40-42 μm diam.; oospores almost globose, 30-36 μm diam., wall smooth, hyaline.

Specimen examined: In lentils field, on the living leaves of *Astragalus hamosus* L. (Fabaceae), Turkey, Diyarbakir Province, 37°66'37" N, 41°96'65" E, 464 m, July 11, 2014. CÖ 201429.

Conidiophores of *P. astragalina* from Europe are 200-400 µm long, 5-8 µm wide; conidia 12-32 x 9-26 µm, mostly 20-25 x 19-22 µm; oogonia 38 µm diam. and oospores 30 µm diam. (Gäumann, 1923: 188). Conidia from Transcaucasia are 12-28 x 10-26 µm, frequently 18-22 x 15-19 µm (Uljanishchev et al., 1985). Conidiophores of this fungus in Turkey are slightly longer, conidia shorter, oogonia and oospores are larger.

***Peronospora myagri* Mayor (Figure 7)**

Mayor (1962)

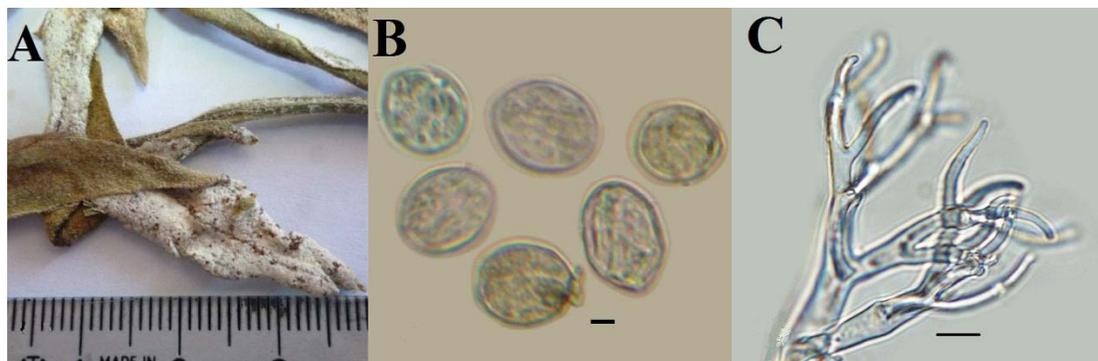


Figure 7 - *Peronospora myagri*. A: Symptoms. B: Conidia. C: Ultimate branchlets. Bars: B 5 mm; C 10 µm.

Conidial coating on stems and on lower surface of leaves which have corresponding yellow patches on their upper surface, dense, tomentose, white, whitish, greyish-white, almost entirely covered by a blade. On the stems, coating is greyish-white, scattered. Conidiophores 210-550 µm long, slender, colorless; trunk straight to slightly curved, 125-400 µm long, 10-15 µm wide below the first branch; branches dichotomous, branched in four to six orders, straight to slightly curved; ultimate branchlets in pairs, situated at an acute angle, approximately equal, arcuate, sinuate, curvate, (7.5-)10-25 µm long, (1.5-) 2.0-2.5 µm wide at the base, apex obtuse or slightly rounded. Conidia colorless, oval, or ovate-ellipsoidal, rarely subglobose to globose, (19)20-25 x (15-)16-20 µm, pedicel absent in most conidia. Resting organs not seen.

Specimen examined: In lentils field, on the living leaves of *Myagrimum perfoliatum* L. (Brassicaceae), Turkey, Diyarbakir Province, Çınar, 37°69'10" N, 40°49'50" E, 726 m, April 17, 2015. CÖ 201521.

Described by Mayor (1962) *P. myagri* from France has a shorter conidiophore (185-510 µm, mostly 225-300 µm long), conidia (19-21 x 16-19 µm), and a longer ultimate branchlets (16-38 x 2-2.5 µm), than Turkish samples.

In the light of literature (Göbelez, 1963; 1964; Güven and Tamer, 1993; Ercis and Iren, 1993; Sahin and Tamer, 1998; Tamer et al., 1989, 1990, 1998; Tepe and Özrenk, 1999; Bahcecioglu and Gjaerum, 2003; Kavak, 2003; Sert and Sümbül, 2003; Kirbag, 2004; Sert, 2009; Tunali et al., 2009; Erdogdu et al., 2010; Ekici et al., 2012; Özasan et al., 2013; Erdogdu and Hüseyin, 2013; Kavak and Bilgili, 2015; Özasan et al., 2015) given on Turkish microfungi and Chromista, five microfungi and two Chromista species are new records for Turkey: *Plectosphaerella alismatis*, *Pyricularia grisea*, *Phakopsora artemisiae*, *Puccinia rubefaciens*, *Ustilago trichophora*, *Peronospora astragalina* and *P. myagri*. *Plectosphaerella* and *Phakopsora* are added to the fungal biota of Turkey as new records at generic level. *Peronospora myagri* described here represent the second collection of these species. *Phakopsora artemisiae* known hitherto from Japan, China, Pakistan, India, Taiwan, Korea, and Nepal (Hiratsuka, 1992; Khalid and Iqbal, 1996; Cho and Shin, 2004;), and *P. myagri* known from France on living leaves and stems of *Myagrimum perfoliatum* (Mayor, 1962).

The common broadleaf water weeds of agricultural crops are more serious problem than aquatic grassy weeds. Common water-plantain (*Alisma plantago-aquatica*), a semi-aquatic or aquatic perennial weed is the most troublesome weed in wild rice fields. The foxtails are members of the *Setaria* genus and are one of the worst weed groups interfering with North American and world agriculture and in other disturbed and managed habitats (Holm et al., 1977, 1979, 1997). The weedy *Setaria* spp. include *S. viridis* subspecies *viridis* (green foxtail), *S. glauca* (yellow foxtail), *S. faberii* (giant foxtail), *S. verticillata* (bristly foxtail) and *S. geniculata* (knotroot foxtail) (Pohl, 1951, 1966; Rominger, 1962). *Artemisia dracunculus* (tarragon) is a perennial herb in the Asteraceae (daisy) family. It also possesses a wide range of health benefits. *Galium* spp. (*Galium aparine* and *Galium tricornerutum*) are the problem weeds of agricultural crops. Holm et al. (1991) described *G. aparine* as a serious or principal weed in 10 countries. Worldwide it has been reported as a weed of 19 crops in 31 countries (Holm et al., 1977). *G. aparine* is resistant to phenoxyacetic acid herbicides, and their widespread use, particularly in cereals, before the introduction of sulfonylureas was largely responsible for the increase in *G. aparine* distribution in many European countries (Rola, 1969; Bachthaler and Dancau, 1970; Pawlowski and Wszolek, 1978; Malik and van den Born, 1988). In cereals, Rola (1969) reported potential yield reductions of 30-60%. Roder et al. (1990) found the yield decline caused by one *G. aparine* plant m⁻² was 0.24% in winter barley and 0.14% in winter wheat. Trials in Turkey estimated economic thresholds for the control of *G. aparine* as 0.7-2.1 plants m⁻² (Uygur and Mennan, 1996). Barnyardgrass (*Echinochloa crus-galli*) is found in 36 crops worldwide. It is the world's principal weed of rice, and is particularly serious weed in Australia, Brazil, Ceylon, Chile, Greece, Indonesia, Iran, Italy, Japan, Korea, Philippines, Portugal, Spain and Taiwan. It is among the three worst weeds in cotton in Australia, USSR and Spain; in corn in Australia and Yugoslavia; and in sugarbeets in the United States. It is a principal weed in many other crops and countries (Holm et al., 1977). *E. crus-galli* grows as a weed of waterways, swamps, wetlands and other damp habitats as well as roadsides, waste areas and disturbed sites altering successional processes and outcompeting native vegetation. This species has been listed as an environmental weed in Canada, the United States, Brazil and Australia, where it is ranked among the top 200 invasive plant species (Queensland Department of Primary Industry and Fisheries, 2011). Milkvetch (*Astragalus hamosus*) is widely distributed in Tunisia and in other parts of the world (Zoghalmi and Zouaghi, 2003). *A. hamosus* is a hard drought-tolerant plant potentially useful for soil protection in Mediterranean areas (Patane and Gresta, 2006). Bird's eye cress (*Myagrum perfoliatum*) considered a serious weed of broadleaf crops such as chickpeas, canola, lupins, faba beans, field peas and lentils. Bird's eye cress is considered a potential seed contaminant. It can create blockages during harvest. It has competed with agricultural crops, reducing crop yields by up to 50%, it can smother cereal and canola (Storrie, 2014). Since Bird's eye cress tolerates many of the herbicides used in crops (Government of South Australia, 2014; Texas Invasives, 2013), control in agricultural crops is difficult.

Weeds in agricultural crops are one of the essential economic and agronomic problems of plant production. Traditional agricultural practices have generally focused on herbicides, mechanical, and cultural methods as the main tools for weed management. Although these methods have served crop production well, it is important to recognize that living organisms like insects, fungi, and bacteria as biological control agents for weed management. Some virulent pathogens on the weeds could lead to improved weed control by making the weed less vigorous and reducing its competitive ability. Phytopathogenic fungi are often used for biological weed control. Seven different fungi species have been identified in the current study on seven distinct weed species. These species; *Plectosphaerella alismatis*, *Pyricularia grisea*, *Phakopsora artemisiae*, *Puccinia rubefaciens*, *Ustilago trichophora*, *Peronospora astragalina* and *P. myagri*. *Plectosphaerella* and *Phakopsora* as generic level and others as species are new records from Turkey. These fungi species can be potential biological control agents of these weed species in the era of increasing concerns on environment safety and herbicide resistance. A useful and safe biocontrol agent has to be as specific as possible. However, detailed studies on host specificity and potential of these species to damage/control needs to be explored in detailed studies.

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