

()

Phyllactinia

*

(Erysiphaceae)

Morphology of penicillate cells in the genus *Phyllactinia* (Erysiphaceae)
based on Iranian specimens

**

// :

// :

Phyllactinia

P. guttata

"

*

"... Erysiphaceae

**

Phyllactinia Erysiphaceae :

Ascomycota) Erysiphaceae *Phyllactinia*
(Braun 1987) (Erysiphales

Erysiphaceae

(Yu & Han 1978) (Homma 1937)
(Shin 2000) (Yu *et al.* 1979) (Yu & Lai 1979)
(Nomura 1997)

() (Shin & Lee 2002)
Phyllactinia

(Shin & Lee 2002)
Phyllactinia

("IRAN")

(Charmichael 1955)

BH₂

Phyllactinia

("IRAN")

:

***Phyllactinia babayanii* Simonjan.**

(*Prunus dulcis* (Mill.) D.A. Webb.)

()

/ /

/

(IRAN 3364 F)

/ /

.(IRAN 3365 F)

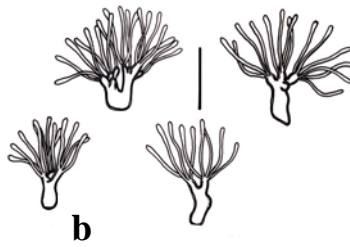
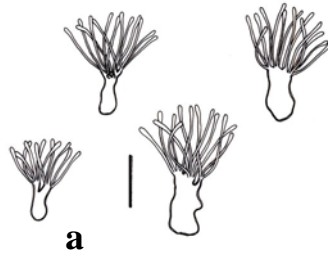
() () × () ()
()

/ () () × (/) ()
()

***Phyllactinia fraxini* (DC.) Fuss**

Fraxinus excelsior L.

() // () // ()
(IRAN 3358 F)



Phyllactinia fraxini (b) *Phyllactinia babayanii* (a)

()

Fig. 1. Penicillate cells of (a) *Phyllactinia babayanii* and (b) *Ph. fraxini* (Scale=50µm).

() () × () ()

		()	()
()	/ /		
	()		
<i>Phyllactinia guttata</i> (Wallr: Fr.) Lév.			
()	/ /	<i>Alnus glutinosa</i> (L.) Gaertn.	
()	()	/ /	
/ /	()	/ /	
/ /	()		
(IRAN 3367 F)	/ /	()	
()	/ /	<i>Carpinus betulus</i> L.	
(IRAN 10995 F)	/ /		
()	/ /		
/ / ()	()	<i>Cornus sanguinea</i> L.	
		(IRAN 10497 F)	
()	/ /	<i>Cornus</i> sp.	
()	/ /	<i>Corylus avellana</i> L.	
()	/ /		
/ ()	()	/ /	
/ / ()	()		
()	/ /	()	
(IRAN 3381 F)	/ /	<i>Cydonia oblonga</i> Mill.	
/ /		<i>Paliurus spina-christi</i> Mill.	
()	/ /	()	
) ()	/ /		
(IRAN 9152 F)	/ /	(
()	/ /	<i>Parietaria officinalis</i> L.	
(IRAN 10599 F)		<i>Prunus armeniaca</i> L.	

() // () *Pyrus communis* L.
// *Pyrus salicifolia* Pall.
. ()

:

Alnus glutinosa

() () × () ()
.

/ () ()
.()

(2002)

(MUMH 157 MUMH 3024) *Alnus japonica* Siebold & Zucc. *P. alni*

Alnus japonica

()

A. glutinosa

Carpinus betulus

() () × () ()

() ()

() () × / /
.()

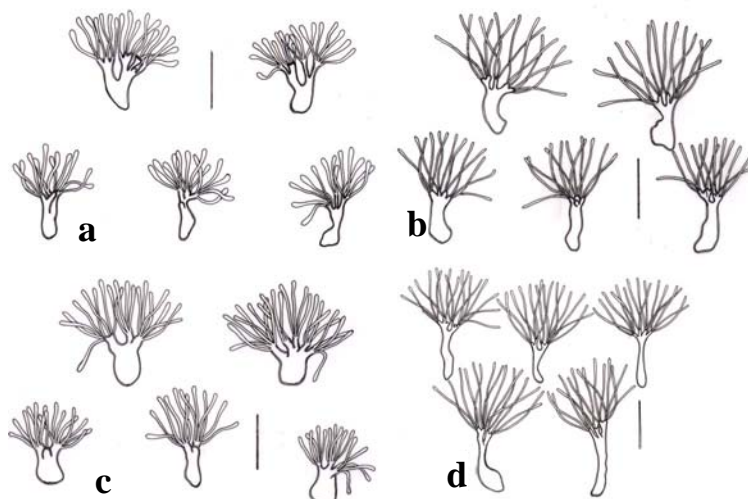
Cornus sanguinea

() × () ()

()

/ ()

.()



Alnus glutinosa (a) *Phyllactinia guttata*
) *Cornus* sp. (d) *Cornus sanguinea* (c) *Carpinus betulus* (b)

Fig. 2. Penicillate cells in *Phyllactinia guttata* from: (a) *Alnus glutinosa*, (b) *Carpinus betulus*, (c) *Cornus sanguinea*, (d) *Cornus* sp. (Scale=50 μm).

Cornus officinalis Sieb. & Zucc. ()

()

P. corni Shin & La

C. sanguinea

Cornus officinalis

Cornus sp.

() () × () ()

()

()

()

|

Cornus sanguinea

Cornus mas L. (Bacigalova et al. 2005)

Corylus avellana

() × () ()
() () × ()
()

Cydonia oblonga

() () × () ()
()
/ (/) () ()
()

Paliurus spina-christi

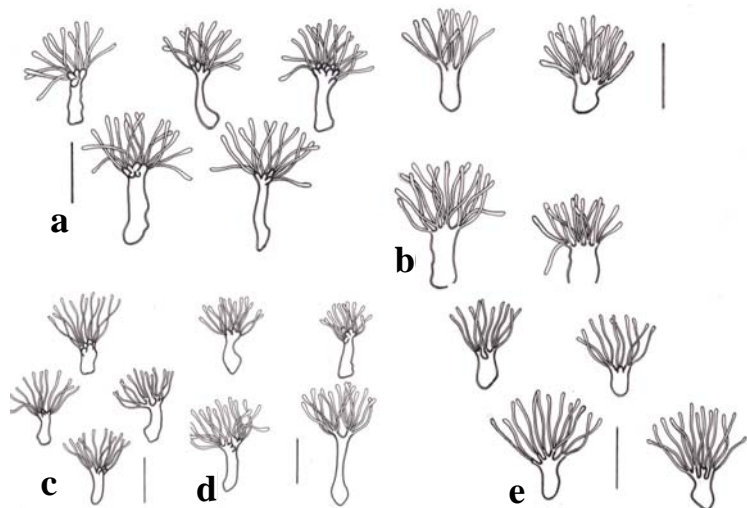
() × () ()
/ () ()
()

Parietaria officinalis

() () × () ()
() ()
() (/)

Prunus armeniaca

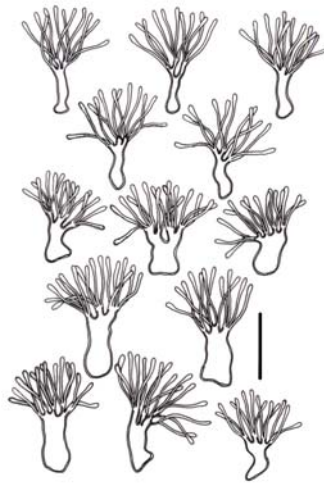
() () × () ()
/ / () ()
()



Corylus avellana (a) *Phyllactinia guttata*
Parietaria officinalis (d) *Paliurus spina-christi* (c) *Cydonia oblonga* (b)
 () *Prunus armeniaca* (e)

Fig. 3. Penicillate cells of *Phyllactinia guttata* from (a) *Corylus avellana*, (b) *Cydonia oblonga*, (c) *Paliurus spina-christi*, (d) *Parietaria officinalis*, (e) *Prunus armeniaca* (Scale=50 μm).

Pyrus spp.
 () () × () ()
 / () () ()
 () ()
Pyrus *P. mali*
 ()



Pyrus communis

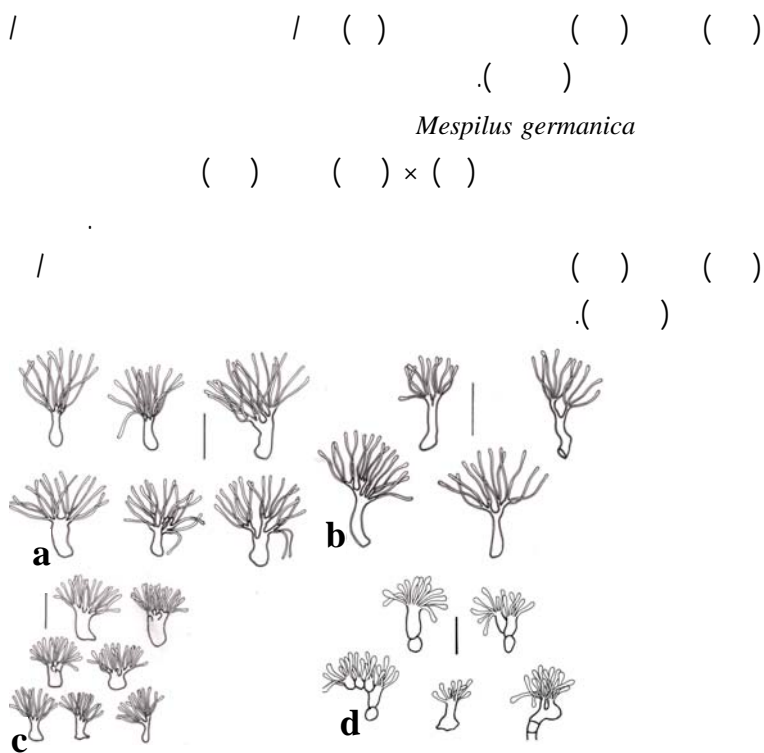
Phyllactinia guttata

() *P. salicifolia*

Fig. 4. Penicillate cells of *Phyllactinia guttata* on *Pyrus communis* and *P. salicifolia* (Scale=50 μm).

***Phyllactinia mali* (Duby) U. Braun.**

	//		<i>Crataegus</i> sp.
//	()	//	()
()	// ()	()	
	()	//	
		()	//
	//		<i>C. meyeri</i> Pojark.
			()
	())	<i>C. monogyna</i> Jacq.
			(IRAN 3380 F)
	//		<i>Mespilus germanica</i> L.
()	//	()	
()	// ()		
			<i>Crataegus</i> spp.
		()	() × () ()
			()



Crataegus spp. *Phyllactinia mali* (a)
) *Ph. pistaciae* (d) *Ph. moricola* (c) *Mespilus germanica* *Ph. mali* (b)
 .(

Fig. 5. Penicillate cells in: (a) *Phyllactinia mali* from *Crataegus* spp., (b) *Ph. mali* from *Mespilus germanica*, (c) *Ph. moricola*, (d) *Ph. pistaciae* (Scale=50 μm).

***Phyllactinia moricola* (P. Henn) Homma**

() // *Morus* sp.
 () //
 // () //
 .(IRAN 11230 F)

() () × () ()
 () ()
 .() / /

()

***Phyllactinia pistaciae* H.D. Shin & Y.J. Choi**

// () *Pistacia vera* L.
(IRAN 3376 F) // (IRAN 3375 F)
// (IRAN 3372 F) //
/ () (IRAN 3373 F)
(IRAN 3374 F)

() × ()

() ()
()

(Shin & Choi 2003)

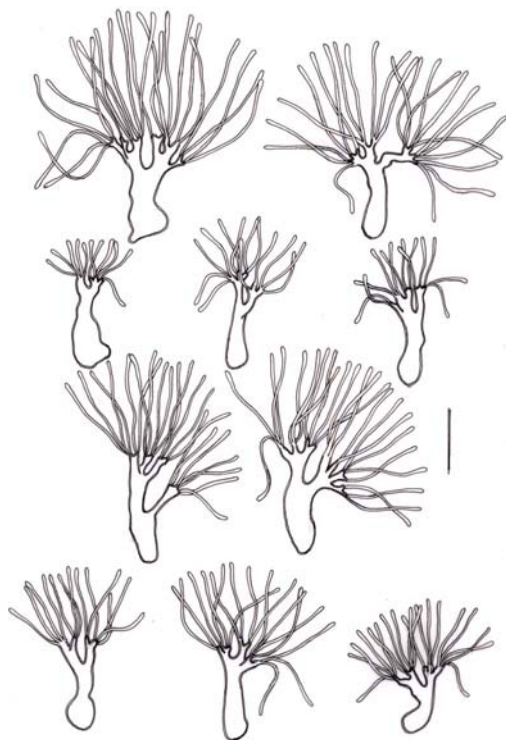
***Phyllactinia roboris* (Gachet.) Blumer**

Quercus macranthera Fisch. & Mey. ex Hohen.

(IRAN 11647 F) //

() () × () ()

/ (/) () ()
()



() *Phyllactinia roboris*

Fig. 6. Penicillate cells of *Phyllactinia roboris* (Scale=50 μ m).

***Phyllactinia* spp.**

Lonicera iberica M.B.

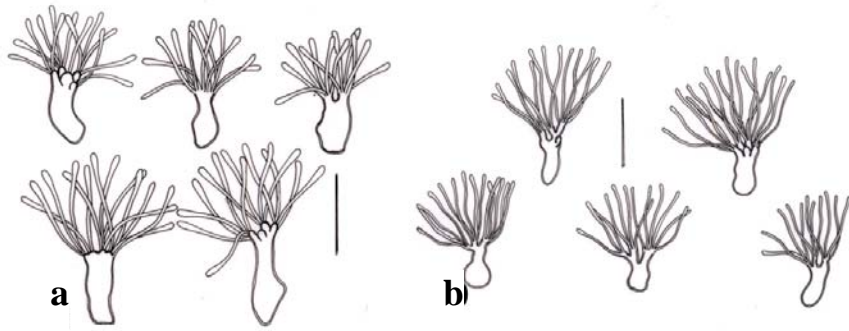
()

//

() - () \times () ()

() () () ()

()



Lonicera iberica (a) *Phyllactinia* spp.
 () *Salix aegyptiaca* (b)
 Fig. 7. Penicillate cells of *Phyllactinia* spp. from (a) *Lonicera iberica*,
 (b) *Salix aegyptiaca* (Scale=50 μm).

//

Salix aegyptiaca L.

(IRAN 11610 F)

() () × () ()
 ()

() ()
 ()

|

S. aegyptiaca

Phyllactinia

()

P. guttata *P. fraxini*

()

P. pistaciae *P. moricola* *Corylus*

()

Mespilus germanica *Crataegus* spp.

Pyrus communis *P. mali*

P. guttata *Pyrus communis*

Cornus

Cornus sp.

P. corni

Cornus sanguinea

()

P. corni

Phyllactinia

Cornus

()

P. guttata

Corylus avellana

P. guttata

P. guttata

P. guttata

P. guttata

) *Corylus*

(

:

P. guttata

P. guttata

P. guttata

Erysiphaceae

144-145

(E-mail: khodaparast@guilan.ac.ir)

**MORPHOLOGY OF PENICILLATE CELLS IN
THE GENUS *PHYLLACTINIA* (ERYSIPHACEAE)
BASED ON IRANIAN SPECIMENS**

M. PIRNIA, S.A. KHODAPARAST* and M. ABBASI

College of Agriculture, Gilan University and
Iranian Research Institute of Plant Protection

Received: 18.09.2006

Accepted: 11.12.2006

The genus *Phyllactinia* is one of the members of Erysiphaceae (Erysiphales, Ascomycota) which parasitize several host plant families. This taxon is well characterized by having acicular appendages with bulbous swelling at the base and penicillate cells which are outgrowth of some ascoma wall cells. A number of challenges exist to distinguish species assigned to this taxon. This is because of a few morphological characters available for species delimitation. Identification is further complicated for some species such as *P. guttata*, the best known species causing powdery mildew on more than 50 host plant families (BRAUN 1987, 1995), even though they possess close morphological characterization. The most taxonomic studies on the genus *Phyllactinia* have focused primarily on characters other than morphology of penicillate cells. The best known study for taxonomic purposes carried out by SHIN & LI (2002). They examined 15 species and concluded that, penicillate cell morphology is consistent in particular species and is sufficient different among species and could be used for species delimitation in combination

* Corresponding author

with other taxonomic criteria. However, SHIN & LI (2002) examined just one specimen belongs to more complicated species viz. *P. guttata*. In this study, we examined specimens collected from 11 different host plant families. Results showed that, Iranian specimens belonging to some species such as *P. fraxini*, *P. pistaciae* and *P. guttata* on *Corylus avellana* possess the same morphology as described by SHIN & LI (2002). However, we also found different results in our investigation. *Phyllactinia mali* on *Crataegus* and *Mespilus* showed different penicillate cell morphology when compared to *Pyrus* isolates. *Phyllactinia* on *Pyrus* has been identified as *P. mali* by some authors (SHIN 2000, SHIN & LI 2002 and NUMURA 1997), though we tentatively identified it as *P. guttata*. Two specimens from *Cornus* spp. were examined in this study. These specimens showed different penicillate cell morphology. The fungus on *Cornus sanguinea* showed the same morphology as drawn by SHIN & LI (2002), but the other one on *Cornus* sp. was different. Other specimens assigned to *P. guttata* showed more or less different morphology in penicillate cells. It is difficult to conclude whether these specimens belong to different taxa. The penicillate cell morphology may not be sufficient to detect the particular identities among complex species, *P. guttata*. However, it may be useful for species identification in combination with other characters.

We recommend more studies in addition to analysis of penicillate cell morphology especially DNA sequencing to characterize new taxa of these fungi.

All specimens cited in this paper, are deposited in the mycological collection of Gilan University, Rasht and Fungal Reference Collection ("IRAN") of the Ministry of Jihad-e-Agriculture, Tehran (Iran).

Key words: Powdery mildew, Erysiphaceae, *Phyllactinia*, Penicillate cells

Enumeration of taxa:

1. *Phyllactinia babayanii* Simonyan, Mikol. Fitopatol. 18(4): 465, 1984

On *Prunus dulcis* (Mill.) D.A. Webb., Shabastar-Tasudj road; Isfahan, (Gilan 432 F, IRAN 3364 F, IRAN 3365 F).

2. *Phyllactinia fraxini* (DC.) Fuss, Archiv des Vereins für Siebenbürgische Landeskunde, Neue Folge 14(2): 463, 1878

On *Fraxinus excelsior* L., Gilan, Ghaleh roodkhan; E. Azarbaidjan, Arasbaran forest; Karaj (Gilan 434 F, Gilan 436 F, IRAN 3358 F).

3. *Phyllactinia guttata* (Wallr.) Lév., Anns Sci. Nat., Bot., sér. 3 15: 144, 1851

On *Alnus glutinosa* (L.) Gaertn., Gilan, Masuleh; Shaft; Amlash; Ziyabar-Talesh road; Talesh-Astara road; Ramsar, (Gilan 411 F, Gilan 410 F, Gilan 413 F, Gilan 414 F, Gilan 415 F, IRAN 3367 F). On *Carpinus betulus* L., Masuleh; Azarbaidjan, (Gilan 426 F, Gilan 427 F, IRAN 10995 F). On *Cornus sanguinea* L., Karadj, (IRAN 10497 F). On *Cornus* sp., E. Azarbaidjan, Arasbaran forest (Gilan 406 F). On *Corylus avellana* L., Masuleh; Sumaehsara; Tonekabon; Amlash; E. Azarbaidjan, Arasbaran forest (Gilan 416 F, Gilan 417 F, Gilan 418 F, Gilan 419 F, Gilan 421 F, Gilan 421 F). On *Cydonia oblonga* Mill., Gorgan (IRAN 3381 F). On *Paliurus spina-christi* Mill., Talesh-Astara road; Astara, E. Azarbaidjan, Arasbaran forest; Gorgan (Gilan 407 F, Gilan 408 F, Gilan 409 F, IRAN 9152 F). On *Parietaria officinalis* L., Roodbar (Gilan 74 F). On *Prunus armeniaca* L., Mashhad (IRAN 10599 F). On *Pyrus communis* L., Uromieh; E. Azarbaidjan, Arasbaran forest (Gilan 423 F). On *Pyrus salicifolia* Pall., E. Azarbaidjan, Arasbaran forest (Gilan 422 F).

4. *Phyllactinia mali* (Duby) U. Braun, Feddes Repert., Sp. Nov., Beih. 88(9-10): 657, 1978 (1977)

On *Crataegus* sp., Amlash; Masuleh; Shaft; Rasht, Saravan forest; Talesh-Astara road; Karadj (Gilan 441 F, Gilan 442 F, Gilan 443 F, Gilan 444 F, Gilan 445 F, Gilan 447 F). On *C. meyeri* Pojark., Arasbaran forest (Gilan 446 F). On *C. monogyna* Jacq., Karadj (IRAN 3380 F). On *Mespilus germanica* L., Gilan, Talesh-Khotbehsara road; Rasht, Saravan forest; E Azarbaidjan, Arasbaran forest (Gilan 440 F, Gilan 442 F, Gilan 437 F).

5. *Phyllactinia moricola* (Henn.) Homma, Trans. Sapporo nat. Hist. Soc. 11(3): 174, 1930

On *Morus* sp., Amlash; Lahidjan; Langarood-Roodsar road; Shaft (Gilan 428 F, Gilan 430 F, Gilan 431 F, IRAN 11230 F).

6. *Phyllactinia pistaciae* H.D. Shin & Y.J. Choi, Mycotaxon: 57: 219, 2003

On *Pistacia vera* L., Rafsandjan; Jabale Barez; Ghazvin; Kerman (IRAN 3375 F, IRAN 3376 F, IRAN 3372 F, IRAN 3373 F, IRAN 3374 F).

7. *Phyllactinia roboris* (Gachet) S. Blumer, Beitr. Kryptfl. Schweiz 7(1): 389, 1933

On *Quercus macranthera* Fisch. & Mey. ex. Hohen., E. Azarbaidjan, Arasbaran forest (IRAN 11647 F).

8. *Phyllactinia* spp.

On *Lonicera iberica* M.B., E. Azarbaidjan, Arasbaran forest (Gilan 405 F).

On *Salix aegyptiaca* L., E. Azarbaidjan, Arasbaran forest (IRAN 11610 F).

To observe the figures, please refer to the Persian text (pages: ۱۷۷-۱۹۲).

References

- BACIGALOVA, K. TOTH, D. and BRINDZA, J. 2005. Powdery mildew *Phyllactinia corni* Causing Disease on *Cornus mas* (Cornaceae) - A new record for Slovakia. Plant Protect. Sci. 41(2): 90-93.
- BRAUN, U. 1987. A monograph of the Erysiphales (powdery mildews). Beiheft zur, Nowa Hedwigia 89: 1-700.
- CARMICHAEL, J.W. 1955. Lacto-fuchshin: A new medium for mounting fungi. Mycologia 47: 611.
- HOMMA, Y. 1937. Erysiphaceae of Japan. J. Fac. Agric. Hokkaido Imp. Univ. 38: 183-461.
- NOMURA, Y. 1997. Taxonomic study of Erysiphaceae of Japan. Yodendo Ltd., Tokyo. 281 pp. (in Japanese).

-
- SHIN, H.D. 2000. Erysiphaceae of Korea. Nat. Inst. Agric. Sci. Tech. Rural Development Administration. Suwon. Korea. 320 pp.
- SHIN, H.D. and CHOI, Y.J. 2003. *Phyllactinia pistaciae* sp. nov. on *Pistacia vera*. Mycotaxon 57: 213-221.
- SHIN, H.D. and LEE, H.J. 2002. Morphology of penicillate cells in the genus *Phyllactinia* and its taxonomic application. Mycotaxon 53: 301-325.
- YU, Y.N. and HAN, S.J. 1978. Taxonomic studies on the genus *Phyllactinia* of China I. The delimitation of the species. Acta Microbiol. Sinica 18: 108-117 (in Chinese with English summary).
- YU, Y.N. and LAI, Y.Q. 1979. Taxonomic studies on the genus *Phyllactinia* of China II. *Phyllactinia* with short perithecial appendages. Acta Microbiol. Sinica 19: 11-23.
- YU, Y.N., LAI, Y.Q. and HAN, S.J. 1979. Taxonomic studies on the genus *Phyllactinia* of China III. *Phyllactinia* with long perithecial appendages. Acta Microbiol. Sinica 19: 131-145.

Addresses of the authors: M. PIRNIA, Department of Plant Protection, College of Agriculture, Zabol University, Zabol; Dr. S.A. KHODAPARAST, Department of Plant Protection., College of Agriculture, Gilan University, Rasht (khodaparast@gilan.ac.ir) and Dr. M. ABBASI, Department of Botany, Iranian Research Institute of Plant Protection, P.O. Box 1454, Tehran 19395, Iran.

