

## Brief history of mycology in Iran

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**Abstract:** The history of mycology in Iran is presented in five periods. In the first period (until 1860) there is no sign of Iranian fungi in scientific literature. In the second period (1860–1941) the study of Iranian fungi was started by foreign mycologists who did not visit Iran but worked on plant material collected by botanists. In the third period (1941–1963) the study of Iranian fungi was started by a first generation of Iranian mycologists and also fungal plant pathology was started in Iran. A second generation of Iranian mycologists used pure culture technique in the fourth period (1963–2000). In this period mycology was taught separately from botany and plant pathology at universities, and MSc and PhD courses were initiated at some universities. In the fifth period (from 2000), a third generation of Iranian mycologists used molecular techniques to study Iranian fungi. An Asian Mycological Congress was held in Iran in 2001; the Iranian Mycological Society was founded in 2010; an MSc course of mycology was initiated at Esfahan University; the first Iranian Mycological Congress was held at Gilan University in 2013, and the first Iranian mycological journal (*Mycologia Iranica*) was launched.

**Key Words:** Iranian mycology, fungi, historical review, fungal plant pathogens

### INTRODUCTION

The study of fungi in Iran was initiated by foreign mycologists. Most of these mycologists did not visit Iran but received fungal material from botanists who came to Iran to collect plants. These botanists also collected fungi separately, or their plant material was examined by mycologists for epiphytic/parasitic fungi. As a result, lists of fungi were published separately or together with lists of plants in European literature. A checklist of all relevant literature is already prepared by Ershad (2009).

The Iranian mycologists (from 1941 up to now) belong to three generations. To summarize the history of Iranian mycology we describe here five periods.

We list some publications of these periods in chronological order.

#### 1. First period: until 1860

In this early period of time we see no sign of Iranian fungi with scientific names in the literature; in case there was anything published, it was never noticed by later mycologists.

#### 2. Second period: 1860–1941

This 81 years period is distinct from others because:

- I. The study on Iranian fungi started.
  - II. All publications on Iranian fungi are by foreign researchers.
  - III. Foreign mycologists did not visit Iran, but they obtained fungal material from botanists, who collected plants in Iran.
  - IV. No fungal plant disease was yet reported from Iran.
1. The first publication on Iranian fungi was published by two European botanists, E. Boissier (Fig. 2a) and F. Buhse; 33 fungal species, mostly cap fungi, were named, which had been collected by F. Buhse (Fig. 1) (Boissier & Buhse 1860).
  2. Rabenhorst (1871) authored the second publication based on fungi collected by C. Haussknecht during two excursions in Iran.
  3. M.C. Cooke (Cooke 1880) named eight Iranian species collected in Kurdistan and Loristan provinces together with fungi of other parts of the world.
  4. Richard von Wettstein (1885) studied Iranian fungi collected by J.F. Polak and Th. Pitcher.
  5. Aitchison & Hemsley (1887) mentioned *Fomes fomentarius* in their paper on the Flora of Afghanistan.
  6. Masee (1899) published a list of various fungi including two Iranian species.
  7. The study of Iranian fungi was continued more seriously when Joseph Friedrich Nicolaus Bornmüller (Fig. 2b), a famous German botanist, started excursions in Asian countries. The material collected by Bornmüller was forwarded to reputed mycologists such as P. Magnus and H. Sydow.

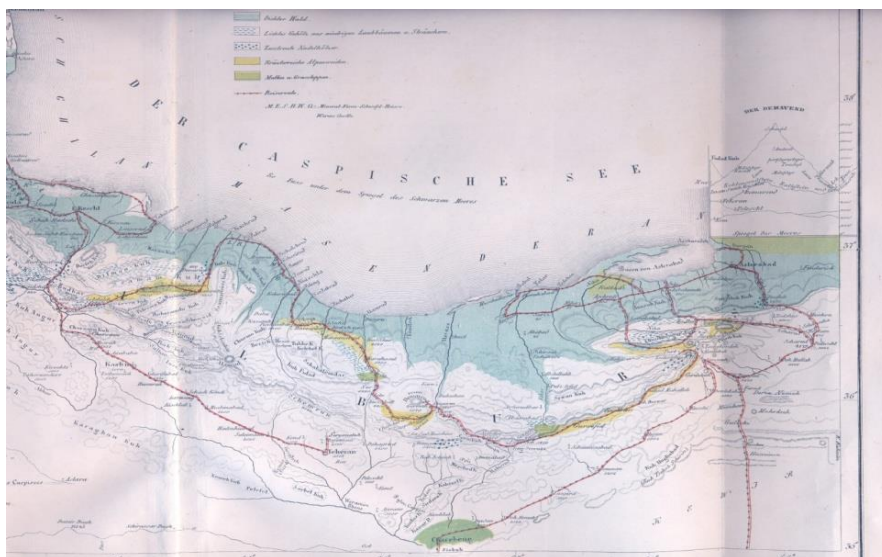


Fig. 1. Buhse's edition course in Iran during 3 Feb. 1847 – 22 June 1849.

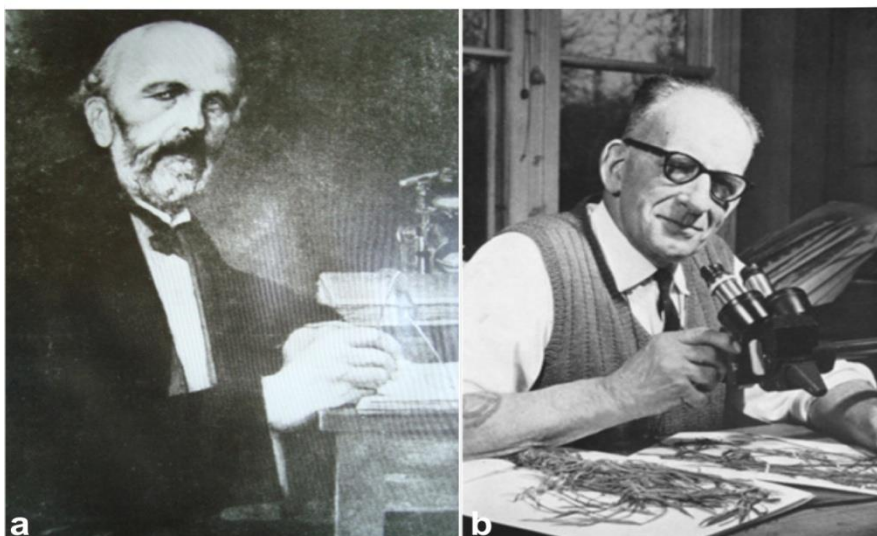


Fig. 2. (a) E. Boissier, (b) J. Bornmüller.

Bornmüller himself reported part of the fungi he collected together with plants in two publications (Bornmüller 1908, 1911). Another part of the fungi was reported by Sydow & Sydow (1908a, 1908b). The rest and the majority of the fungi were identified by P. Magnus and published in six papers (Magnus 1896, 1893, 1899, 1900, 1903, 1912).

8. Chatin (1897) reported two species of Iranian truffles.
9. Rostrup (1908) published three Iranian fungal species based on material collected by O. Paulsen from central Asia and Iran
10. G. Fragoso (1918) published two papers, based on material collected by F.M. de la Escalera from Khuzestan and upstream of the Karun River.
11. Iran is mentioned in the title of a publication

authored by R. Picbauer (1932), without mention of a locality in Iran. The material was collected by F. Nabelek who travelled to Iran and Turkey for plant collection.

12. One of the greatest foreign mycologists who contributed most to Iranian mycology was the famous Austrian mycologist Franz Petrak (Fig. 3b). He published a first paper in 1939 on material collected by K.H. Rechinger (Fig. 3a). Petrak only started his study on Iranian fungi in this period, but published major papers on Iranian fungi in the third period and one in the fourth period.

### 3. Third period: 1941–1963

This period is different from others because:

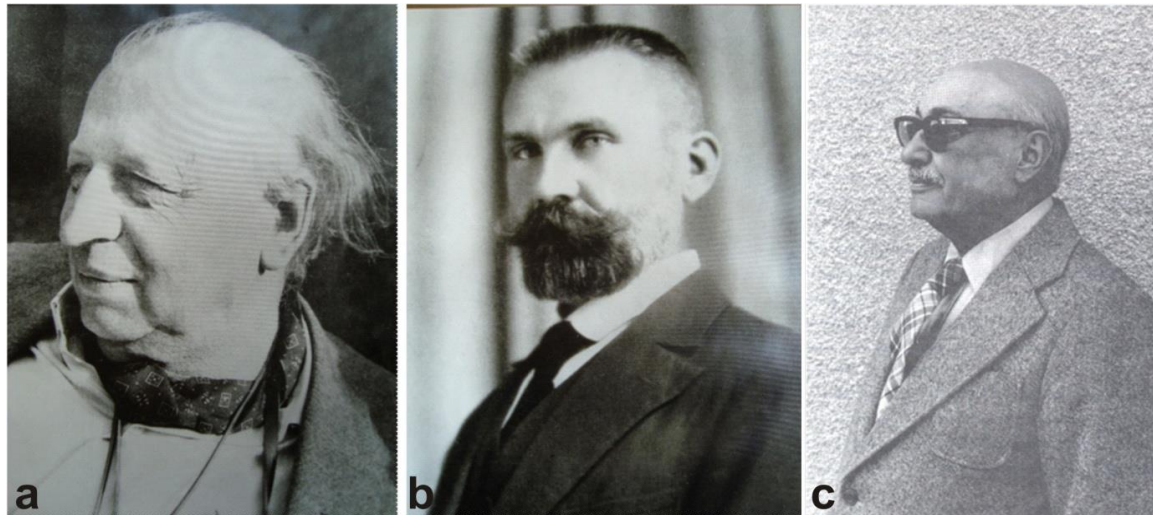


Fig. 3. (a) Karl Heinz Rechinger, (b) Franz Petrak, (c) Esfandiar Esfandiari.

I. Iranian mycologists (first generation) started studying Iranian fungi.

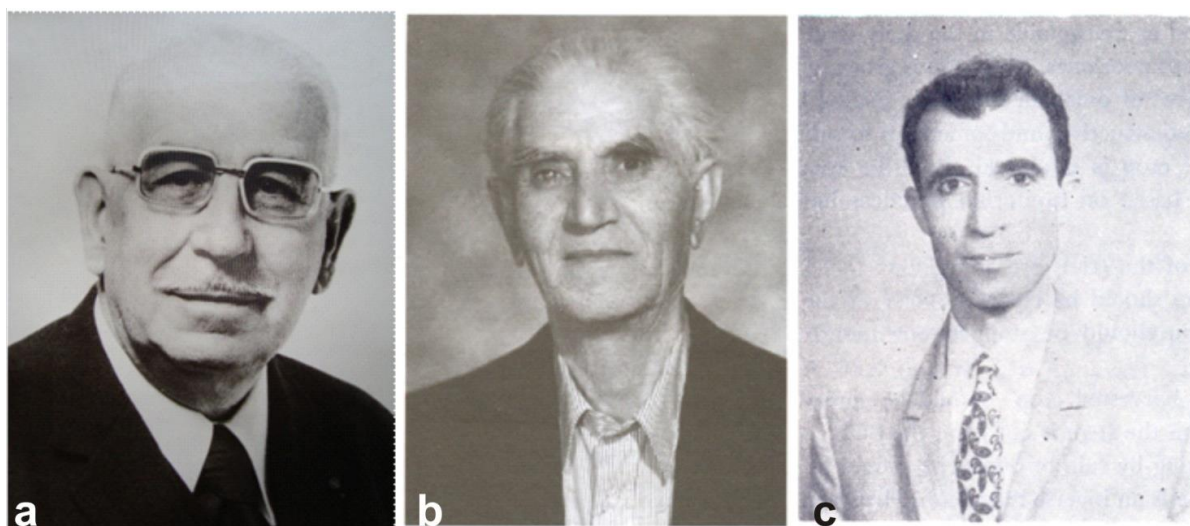
II. The study of fungal plant pathology was started in this period.

1. E. Esfandiari (Fig. 3c) is the first Iranian mycologist who published the result of his studies in collaboration with F. Petrak (Petrak & Esfandiari 1941). Esfandiari had a close collaboration with Petrak during the course of his studies and also published another paper with Petrak in 1950 (Esfandiari & Petrak 1950). Esfandiari also collaborated with the Czech mycologist Albert Pilát on the identification of cap fungi of Iran. He has authored another 10 papers on fungi or plant-pathogenic fungi of Iran.
2. F. Petrak has contributed most to the Iranian mycology in this period. He studied the fungi collected by E. Esfandiari and/or G. Scharif and sent to Vienna. Petrak published another 18 papers on Iranian fungi in this period.
3. J.A. von Arx in a paper published in 1949 on the genus *Mycosphaerella* mentions the names of a few Iranian specimens that had already been reported by earlier mycologists.
4. E. Khabiri (Fig. 4) is another Iranian mycologist who published his studies on Iranian fungi in a French journal in 1952, 1956 and 1958. Besides, he published a book on mycology for Iranian students.
5. The Belgian mycologist R.L. Steyaert was in Iran in 1952 and 1953. He worked on plant diseases together with Iranian scientists. During his stay in Iran he produced a book in French on Diseases of Forest Trees which was translated into Persian by A. Manuchehri and G. Scharif (Fig. 5b,c).
6. D.M. Henderson published five papers on Asian rust fungi in 1957, 1959, 1961, 1966 and 1969 including a few rust fungi of Iran (Henderson 1969).
7. Another Iranian mycologist who in this period considerably contributed to Iranian mycology was G. Scharif. He published his first paper on grape anthracnose in 1949. The title of his thesis was: "Étude morphologique et biologique de quelques champignons foliicoles des agrumes en Iran". He also published a number of other papers mostly on fungal plant diseases in Iran. As mentioned earlier, Scharif had collected and preliminarily studied the fungi that were later studied and described by Petrak.
8. R. Pakravan is another Iranian mycologist who did his PhD thesis on biology and classification of fungi attacking rose shrubs in Iran in 1958.
9. The French mycologist Georges Viennot-Bourgin (Fig. 5a) was invited by Tehran University. He collected some fungi and published on them in 1958.
10. The Norwegian mycologist Ivor Jørstad, reported the results of his study on fungi of Iran in a few papers in 1960. The materials had been collected by his compatriot botanist, P. Wendelbo.
11. The French mycologist Roger Heim travelled to Iran in 1960 and published a paper on *Pleurotus eryngii* (Heim 1960).
12. Among foreign mycologists we should also name the Italian mycologist C. Golato, who did not work on Iranian fungi himself but published a paper in 1960, in which he named a few fungal species that were already published by earlier mycologists.
13. A. Manuchehri and E. Mohammadi-Doustdar considerably contributed to Iranian mycology mostly in the field of mycology teaching.





**Fig. 4.** Ezatollah Khabiri in the middle with MSc graduated students (Front, left to right: Abbas Sadeghi, Djafar Ershad, Behzad Sadeghi-Tehrani, Keramatollah Izadpanah, Ezatollah Khabiri, Abdollah Mejrin, Hassan Eshtiaghi, Aziz Kiavand (Rakhshe Khorshid), Atahollah Yazdaniha, Abdolkarim Eslami. Back: Morteza Badiezagdegan, Sirius Aghevli) in 1969. Tehran University.



**Fig. 5.** (a) G. Viennot-Bourgin, (b) G. Scharif, (c) A. Manuchehri.

#### 4. Fourth period: 1963–2000

This 37 years period (activities of the second generation of Iranian mycologists) is distinct from other periods for the following reasons:

- I. Until then no pure cultures of fungi had been prepared in Iran. With the foundation of the

Iranian Research Institute of Plant Protection in Tehran equipments and materials for growing fungi were prepared and developed. It then became possible to work on most fungal groups. This type of research was also initiated in Iranian universities in 1963.

- II Thanks to the growing number of Iranian mycologists and plant pathologists most of the work on Iranian fungi was done by Iranian workers.
- III. In earlier periods papers on the identification of fungi from Iran generally covered all groups of fungi, but from this period on, papers on specific fungal groups in addition to identification monographs on the fungi of Iran were published.
- IV. Mycology started to be taught separately from plant pathology and/or botany at universities.
- V. At some universities MSc and PhD courses were initiated by some scientific branches relating to mycology, and some interested students chose mycological subjects for their theses.

Because of the rather large number of Iranian mycologists in this period, we refrain from listing their names. But we feel a need to introduce some foreign researchers who contributed to Iranian mycology in this period:

1. E. Niemann (Fig. 6) was a German plant pathologist who for many years worked for the Iranian Research Institute of Plant Protection as a colleague of Iranian researchers. His contribution to Iranian plant pathology and mycology was considerable enough to regard him as one of the founders of modern fungal plant pathology in Iran. He authored nine papers on plant diseases (together with his Iranian colleagues) that were published in the Iranian Journal of Applied Entomology and Plant Pathology during 1963–1967.
2. In 1963 A. Dubuis & L. Faurel reported eight fungal species in a list of plant species that were collected by R. Pasquier.
3. In 1964 F. Petrak published another paper and reported two new fungal species from Iran.
4. D. Boublis & A. Nazemille wrote a paper on grape diseases in Azarbaijan province (West of Iran) in 1966 and reported on fungi isolated from grapes in that region.
5. The American researcher W.J. Kaiser (Fig. 7) worked for many years at the College of Agriculture, Tehran University, on diseases of pulses and published his first paper in 1967.
6. G. Viennot-Bourgin travelled to Iran in the same period and authored four papers alone or jointly with Iranian colleagues.
7. The Norwegian mycologist Fin-Egil Eckblad (1970) published his findings on Gasteromycetes of Iran, Afghanistan and Iraq based on material collected by P. Wendelbo from Iran.
8. The German mycologist Wolfgang Gerlach (Fig. 8) worked for three months in Iran in 1968 and published three papers on Iranian *Fusarium* and *Cylindrocarpon* species alone or jointly with Iranian colleagues (Gerlach & Ershad 1970).



**Fig. 6.** Emil Niemann (middle), Nasser Zalpoor (left) and Djafar Ershad (right) in 1964.



9. W. Frey & H.J. Mayo (1971) listed papers published about plants and fungi of Iran.
10. R.L. Steyaert visited Iran again and in 1972 published a paper on *Ganoderma* reporting a few Iranian collections.
11. The American researcher J. Altman worked in Iran (Power & Water Organization, Dezful, Khuzistan) on plant diseases and published a few papers on fungal plant diseases.
12. The Austrian Harald Riedl travelled to Iran in spring 1974 in order to collect plants, fungi and lichens. He jointly published a paper with his Iranian collaborator (Riedl & Ershad 1977).
13. R. Watling & J. Sweeney (1974) and Watling & N.M. Gregory (1974) published two papers on higher fungi of Iran and Turkey.
14. W. Probst (1977) published on the distribution of *Phellinus torulosus* in Caspian Sea forests.
15. M. Svrček (1980) introduced some Iranian fungi.
16. The Swedish mycologist Nils Hallenberg (Fig. 9) worked on wood-inhabiting fungi for his thesis; he travelled to the Caspian Sea region a few times with Iranian collaborators; the results were published in four papers (Hallenberg 1978).



**Fig. 7.** From left to right: D. Ershad, Z. Banihashemi, R. Klein, V. Minassian, W.J. Kaiser, K. Izadpanah, M. Okhovat and A. Alizadeh in 2008.



**Fig. 8.** From left to right: T.A. Toussoun, D. Ershad and W. Gerlach in 1968.

17. The Hungarian smut specialist Kálmán Vánky (Fig. 10) travelled to Iran in spring 1990 and with his Iranian collaborator visited central, eastern and northern parts of the country; they published two papers on Iranian smut fungi (Vánky & Ershad 1993).
18. The Norwegian rust specialist H. Gjaerum collaborated with Iranian rust specialists and reported on Iranian rust fungi in a few papers and also published a joint paper with Iranian mycologists (Ershad et al. 1997).
19. The most influential mycologists of this generation were D. Ershad and G.A. Hedjaroude whose students largely formed the next generation of Iranian mycologists. D. Ershad was based at the Iranian Research Institute of Plant Protection (Ministry of Agriculture) and G. A. Hedjaroude was based at

College of Agriculture, Tehran University. They mostly worked on agriculturally important micro-fungi. While D. Ershad focused on water moulds, *Fusarium* and smut fungi, G.A. Hedjaroude mostly worked on ascomycetous and biotrophic fungi.

### 5. Fifth period: from 2000

Great activity by Iranian mycologists of the third generation characterizes this period that is distinct because:

- I. Molecular techniques were used in the characterization of fungi. In this period several Iranian mycologists were trained abroad or at Iranian universities in using molecular techniques in their works.
- II. The Asian International Mycological Congress was held in Karaj, Iran, 2001 (Fig. 11).



Fig. 9. N. Hallenberg.

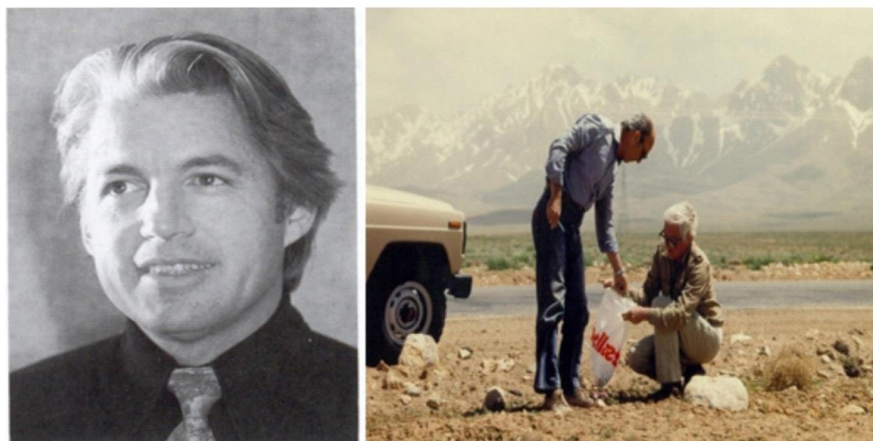


Fig. 10. K. Vánky (left) and with D. Ershad (right, in 1990).



III. A turning point in the history of mycology in Iran is the foundation of the Iranian Mycological Society that took place on 15 September 2010 at the Iranian Research Institute of Plant Protection, Tehran (Fig. 12), where five executive committee members were elected during the first general meeting of the society.

IV. The number of Iranian mycologists increased

strongly and most papers dealt with specific groups of fungi.

V. An MSc course of mycology was initiated at Esfahan University in this period.

VI. The first Iranian Mycological Congress was held in 2013 at Gilan University (Fig. 13).

VII. The Iranian mycological journal (*Mycologia Iranica*), the official journal of the Iranian Mycological Society, was launched.



**Fig. 11.** Asian International Mycological Congress held in Karaj, Iran, 2001. Left to right: R.C. Summerbell, T. Hoshino, W. Gams, R. Zare, Z. Banihashemi, D. Ershad.



**Fig. 12.** First general meeting of the Iranian Mycological Society, 15 September 2010., from left to right: D. Ershad, S. Rezaee, S.A. Khodaparast, A. Azimi Mot'em, M.J. Soleimani, A. Abbasimoghdam, G.A. Hedjaroude, M. Abbasi, M. Javan-Nikkhah, V. Minassian, Z. Banihashemi, Gh.R. Balali, B. Sharifnabi, R. Zare.





**Fig. 13.** First Iranian Mycological Congress, Rasht, Iran, September 2013.

Because of the large number of Iranian mycologists in this period, we refrain from listing their names. We wish, however, to mention the names of outstanding foreign mycologists, whose collaboration and support to young Iranian mycologists has significantly contributed to the advancement of mycology in Iran.

Braun, U.; Cooke, D.E.L.; Crous, P.W.; Gams, W.; Goodwin, S.B.; Gräfenhan, T.; Groenewald, J.Z.; Hallenberg, N.; Hoshino, T.; Hsieh, H.-M.; Ju, Y.-M.;

Kukkonen, I.; Pei, M.H.; Phillips, A.J.L.; Quaedvlieg, W.; Rogers, J.D.; Samuels, G.J.; Scholler, M.; Simmons, E.G.; Smith, J.A.; Summerbell, R.; Takamatsu, S.; Thines, M.; Tsukiboshi, T.; Vánky, K.; Willams, N.A.

Among foreign mycologists Prof. Walter Gams (Fig. 14) who travelled four times to Iran during 2000-2009 provided excellent support and opportunities to many young Iranian mycologists.



**Fig. 14.** Walter Gams.

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## تاریخچه قارچ شناسی در ایران

جعفر ارشاد و رسول زارع✉

موسسه تحقیقات گیاهپزشکی کشور، بخش تحقیقات رستنیها، تهران

**چکیده** تاریخچه قارچ شناسی در ایران در قالب پنج دوره مشخص ارایه شده است. در دوره اول (تا سال ۱۲۳۹) نشانی از قارچ‌های ایران در نوشته‌های علمی به چشم نمی‌خورد. در دوره دوم (بین سال‌های ۱۲۳۹ تا ۱۳۲۰) مطالعه قارچ‌های ایران توسط قارچ شناسان خارجی انجام شد که خود به ایران سفری نداشتند اما قارچ‌های روی نمونه‌های گیاهی که توسط گیاهشناسان جمع‌آوری شده بود را مطالعه کردند. در دوره سوم (بین سال‌های ۱۳۲۰ تا ۱۳۴۲) مطالعه قارچ‌های ایران توسط نسل اول قارچ شناسان ایرانی انجام شد و در این دوره بود که مطالعه بیماری‌های قارچی گیاهان در ایران آغاز شد. نسل دوم قارچ شناسان ایرانی (بین سال‌های ۱۳۴۲ تا ۱۳۷۹) از روش کشت خالص برای شناسایی قارچ‌ها استفاده کردند. در این دوره بود که در دانشگاه‌ها، قارچ‌شناسی به صورت درسی جدای از گیاهشناسی و بیماری شناسی گیاهی تدریس شد و دوره‌های کارشناسی ارشد و دکترای تخصصی در چند دانشگاه آغاز به کار کردند. در دوره پنجم (از سال ۱۳۷۹ به بعد) نسل سوم قارچ شناسان ایرانی از روش‌های مولکولی برای شناسایی قارچ‌ها در ایران استفاده کردند. در سال ۱۳۸۰ یکی از همایش‌های قارچ شناسی آسیا در ایران (کرج) برگزار شد، انجمن قارچ شناسی ایران در سال ۱۳۸۹ تاسیس شد، اولین دوره کارشناسی ارشد قارچ شناسی در دانشگاه اصفهان آغاز به کار کرد، اولین همایش قارچ شناسی ایران در سال ۱۳۹۲ در دانشگاه گیلان برگزار شد، و اولین مجله قارچ شناسی ایران با نام *Mycologia Iranica* راه اندازی شد.

**کلمات کلیدی:** قارچ‌شناسی ایران، قارچ‌ها، مرور تاریخی، بیمارگرهای قارچی گیاهان