

## The Genus *Phyllosticta* in Bombay-Maharashtra.

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The number of species of *Phyllosticta* reported from this State according to Uppal, Patel and Kamat (1934) and Patel, Kamat and Bhide (1949) is 26. Three more additions have been recently made to the Bombay species, one each by Irani, (Unpublished, 1955), viz. *Phyllosticta papayae* var. *macrospora*; V. G. Rao (1962) viz. *Phyllosticta sapindi-emarginati*; and *Phyllosticta zingiberi* Ramak. by Summanwar and Bhide (1962). The genus is represented by 1,460 sp. in Saccardo's *Sylloge Fungorum* (1882—1931). Since then many more species have been reported in literature. There was thus a great need of a thorough and systematic survey of this State for this foliicolous genus. A survey carried out by the writer during 1960—62 in and around Poona brought to light many species of *Phyllosticta* infecting both dicots as well as monocots, several of which were found to be so far undescribed species, some new records to the State and a few new host records.

### Materials and Methods.

The description of species reported in this and subsequent papers are based on fresh collections made by the writer during 1960—1962. The dimensions were determined by measuring 50 pycnidia and 100 pycnidiospores mounted in lacto-phenol. The concept of this genus has undergone considerable modifications since it was first established by Persoon. Host-specificity has been assumed in describing new species in this genus. The writer has taken careful note of morphological characteristics and differences, dimensions of pycnidia and pycnidiospores and above all a critical comparison with species already reported on the host-family, before proposing new species.

This paper reports the results of a critical study of 16 species of *Phyllosticta* of which seven are considered new to science, seven new records to India and two new host records.

### Species new to Science.

#### 1. *Phyllosticta arachidis-hypogaeae* Vasant Rao, spec. nov.

Infection spots irregular in outline, mostly marginal and apical, scattered, dark-brown, epiphyllous. Pycnidia few, scattered, epiphyllous.

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lous, dark-brown, spherical, to globoid, ostiolate, sub-errumpent, thick-walled, measure  $69,3-172,2 \mu$  in diameter. Pycnidiospores elongate to elliptical, hyaline, 1-celled, rounded at both ends, released in a cirrus, measure  $5,25-6,9 \times 2,2-3,57 \mu$ .

Incites leaf spots on *Arachis hypogaeae* L. collected by Vasant Rao in September, 1962 at Poona, India, M. A. C. S. No. 134. (Type).

Maculae epiphyllae, irregulares, plerumque in folii margine ortae, dispersae, obscurae brunneae; pycnidia pauca, dispersa, epiphylla, crassiuscule tunicata,  $69,3-172,2 \mu$  diam.; conidia oblonga vel ellipsoidea, continua, hyalina, utrinque rotundata, in cirrhis expulsa,  $5,25-6,9/2,2-3,57$ .

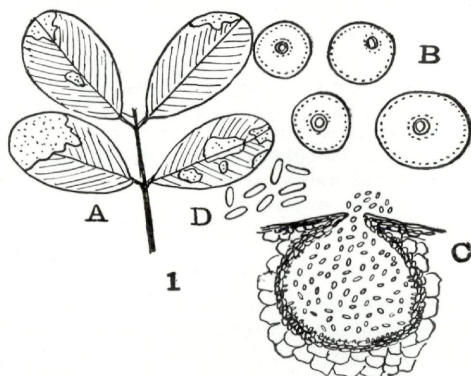


Fig. 1. *Phyllosticta arachidis-hypogaeae*. — A. Symptoms, nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect.  $\times 100$ . — D. Pycnidiospores  $\times 440$ .

No species of *Phyllosticta* has so far been described on this host although Frezzi (1960) noted the occurrence of an undetermined species in association with *Cercospora* leafspot on this host from Argentina. (Ref. Rev. Invest. Agric. B. Aires. 14 (2): pp. 113—155, 20, 1960. Abs. in R. A. M. 40, p. 643, 1961.)

## 2. *Phyllosticta artabotrycola* Vasant Rao spec. nov.

Leaf spots irregular, scattered, ashy-white to dirtybrown with a dirty black or chestnut-coloured, clearcut margin, epiphyllous. Pycnidia abundant, amphigenous, black, thick-walled, scattered, spherical to globose, ostiolate, measure  $71,4-190 \mu$  in diameter. Conidiophores simple, short, obsolete. Pycnidiospores with granular contents, single-celled, ovoid, released in cirrus, measure  $4,2-8,5 \times 3,15-4,5 \mu$ .

Macula epiphyllae, dispersae, pallide cinereae vel obscure brun-

neae ad marginem nigrescentes vel castaneae; pycnidia numerosa, amphigena, atra, crassiuscule tunicata, globosa, ostiolata, 71,4—190  $\mu$  diam.; conidiophora indistincta, continua, brevia; conidia ovoidea, plasmate granuloso repleta, continua, hyalina, in cirrhis expulsa, 4,2—8,5/3,15—4,5  $\mu$ .

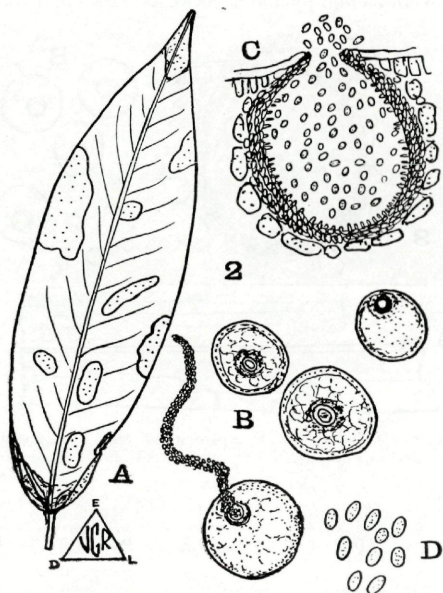


Fig. 2 *Phyllosticta artabotrycola*. — A. Symptoms nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect.  $\times 100$ . — D. Pycnidiospores  $\times 442$ .

On living leaves of *Artabotrys odoratissima* Br. collected by Vasant Rao, in June 1961 at Poona, India., M. A. C. S. No. 135. (Type).

### 3. *Phyllosticta coixicola* Vasant Rao Spec. Nov.

Leaf spots small, irregular, later coalescing to form large necrotic patches, generally marginal, epiphyllous, dirty-brown, papery. Pycnidia dark-brown, scattered, with a broad ostiole, thick-walled, spherical, measure 46,2—114  $\mu$ . in diameter. Pycnidiospores 1-celled, hyaline, ovoid to elongate, measure 4,62—7  $\times$  2,1—3,2  $\mu$ .

Maculae primum parvae, irregulares, postea confluentes et saepe magnam folii partem occupantes, fere semper marginales, epiphyllae, obscure brunneae; pycnidia obscure brunnea, dispersa, late ostiolata,

crassiuscule tunicata, globosa, 46,2—114 diam.; conidia hyalina, ovoidea continua 4,62—7/2,1—3,2  $\mu$ .

On living leaves of *Coix lacryma-Jobi* L. collected by Vasant Rao in June 1962 at Poona, India. M. A. C. S. No. 136 (Type). Note: This species is distinct from *P. coicis-lacrymae* Batista, in possessing much larger pycnidia and pycnidiospores, as shown in Table 1.

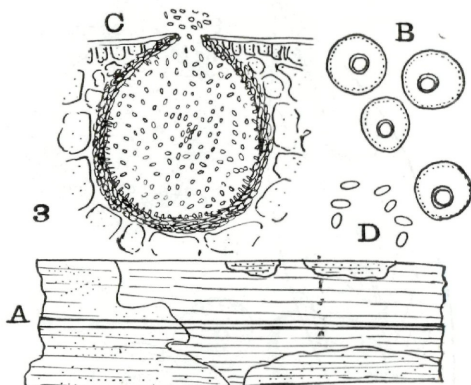


Fig. 3. *Phyllosticta coicicola*. — A. Symptoms nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect.  $\times 100$ . — D. Pycnidiospores  $\times 440$ .

Table 1.

| Fungus                    | Host                        | Pycnidia<br>in $\mu$ | Pycnidio-<br>spores in $\mu$ | Authority             |
|---------------------------|-----------------------------|----------------------|------------------------------|-----------------------|
| <i>P. coicis-lacrymae</i> | <i>Coix lacryma-Jobi</i> L. | 16—24                | 3,6 $\times$ 2—2,5           | Battista**)<br>(1954) |
| Poona Species             | <i>Coix lacryma-Jobi</i> L. | 46,2—114             | 4,62—7 $\times$<br>2,1—3,2   | Author                |

\*\* ) Battista A. C.: An. Congr. Soc. Bot. Brazil 4: p. 84—88, 1953. (Abs. in R. A. M. 33, P. 689. 1954).

#### 4. *Phyllosticta jasminina* Vasant Rao spec. nov.

Infection spots sub-circular to irregular, scattered, amphigenous, ashy-white to dirty-brown. Pycnidia spherical to globose, sub-epidermal, dark-brown, ostiolate, amphigenous, few per spot, and measure 67,2—172,5  $\mu$  in diam. Spores hyaline, 1-celled, cylindrical to allantoid, tapering towards both ends measure 5,25—7,35  $\times$  3,2—4  $\mu$ .

Maculae suborbiculares vel irregulares, dispersae, amphigenae, cinerascetes vel obscure brunneae; pycnidia amphigena, laxissime



dispersa, globosa, subepidermalia, obscure brunnea, ostiolata, 67,2—172,5  $\mu$  diam.; conidia cylindracea, continua plus minusve allantoidea, utrinque plus minusve attenuata, 5,25—7,35/3,2—4  $\mu$ .

Incites leaf spots of *Jasminum sambac* Ait. collected by Vasant Rao in August 1962, Poona, India, M. A. C. S. No. 137 (Type).

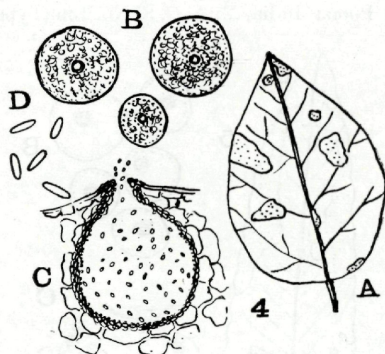


Fig. 4. *Phyllosticta jasminina*. — A. Symptoms nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect.  $\times 100$ . — D. Pycnidiospores  $\times 440$ .

##### 5. *Phyllosticta polyalthicola* Vasant Rao spec. nov.

Leaf spots irregular and smaller in the beginning, later forming large necrotic areas; epiphyllous, generally marginal, dark-brown, papery. Pycnidia black, scattered, ostiolate, globose, amphigenous, measure 62—142,8  $\mu$  in diameter. Pycnidiospores hyaline, 1-celled ellipsoid, thin-walled, measure 5,1—6,3  $\times$  3,3—4,2  $\mu$ .

Maculae epiphyllae, irregulares, primum parvae, postea accrescentes et magnam folii partem occupantes, plerumque in margine ortae, obscure brunneae; pycnidia amphigena, dispersa, atra, ostiolata, 62—142,8  $\mu$  diam.; conidia ellipsoidea, tenuiter tunicata, continua, hyalina, 5,1—6,3/3,3—4,2  $\mu$ .

On living leaves of *Polyalthia longifolia* Benth. and Hook. collected by Vasant Rao in September 1961 at Poona, India, M. A. C. S. No. 138 (Type).

##### 6. *Phyllosticta pothosina* Vasant Rao spec. nov.

Infection spots irregular, marginal, large, dark-brown to ashy-white, rough, mostly starting from the margins, epiphyllous, papery, sometimes in zonations. Pycnidia abundant, epiphyllous, sub-epidermal, spherical to globoid, ostiolate, measure 54,6—132,3  $\mu$  in diameter. Pycnidiospores small, hyaline, 1-celled, cylindrical or elongate measure 4,2—6,3  $\times$  2,1—3,15  $\mu$ .

Maculae epiphyllae, irregulares, plerumque in folii margine evolutae, magnae, obscure brunneae, postea cinerascetes, interdum zonatae; pycnidia numerosa, epiphylla, subepidermalia, globosa, ostiolata, 54,6—132,3  $\mu$  diam.; conidia cylindracea vel oblonga, continua, hyalina, 4,2—6,3/2,1—3,15  $\mu$ .

On living leaves of *Pothos scandens* L. collected by Vasant Rao in July, 1962 at Poona, India, M. A. C. S. No. 139 (Type).

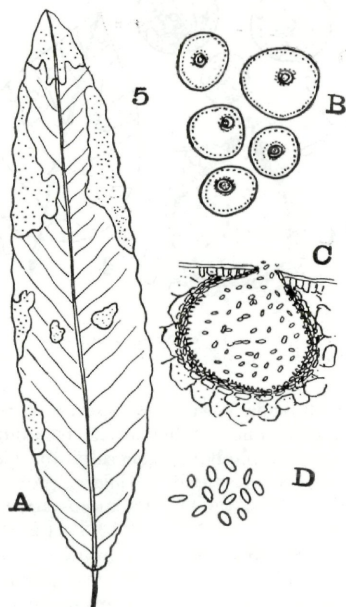


Fig. 5. *Phyllosticta polyalthicola*. — A. Symptoms, nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect. 100. — D. Pycnidiospores  $\times 440$ .

#### 7. *Phyllosticta trilobachnes* Vasant Rao spec. nov.

Infection spots ovoid to irregular, papery, dirty-white to light-brown, with a distinct rusty-brown linear margin, epiphyllous. Pycnidia spherical to globose, dark-brown to black, epiphyllous, scattered, with a broad ostiole, thick-walled, measure 58,8—174,3  $\mu$  in diameter. Pycnidiospores hyaline, 1-celled, thin-walled, ellipsoid, measure 4—5,3  $\times$  2,2—3  $\mu$ .

Maculae epiphyllae, ellipticae vel plus minusve irregulares, sordide albidae vel pallide brunneae, linea ferruginea bene limitatae; pyc-

*nia globosa*, epiphylla, obscure brunnea vel nigrescentea, ostiolo lato praedita, crassiuscule tussicata 58,8—174,3 diam.; comidia ellipsoidea, continua, hyalina, tenuiter tunicata, 4—5,3/2—2,3  $\mu$ .

On living leaves of *Trilobachne* sp. collected by Vasant Rao in June 1962 at Poona, India, M. A. C. S. No. 140 (Type).

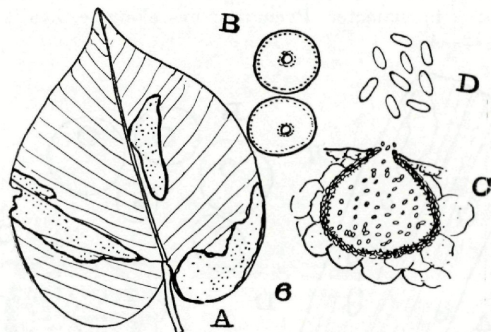


Fig. 6. *Phyllosticta pothosina*. — A. Symptoms nat. size. — B. Pycnidia  $\times 70$ . — C. Pycnidium in sect.  $\times 100$ . — D. Pycnidiospores  $\times 440$ .

#### New Records to India.

##### 1. *Phyllosticta celosiae* Thüm. (Sacc. 3, p. 54. 1884).

Leaf spots ashy-white to dirty-brown, small, irregular, mostly marginal, epiphyllous. Pycnidia epiphyllous, scattered, few, spherical, dark-brown, 46,2—168  $\mu$  in diameter. Spores hyaline, simple, oval, 3,36—5,46  $\times$  2,73—4,2  $\mu$ .

On the living leaves of *Celosia cristata* L. (Cox's Comb) collected by Vasant Rao in June 1962 at Poona, India.

##### 2. *Phyllosticta desmodiicola* Died. (Sacc. 25, p. 47. 1931).

Infection spots mostly marginal, irregular in outline, brownish amphigenous, scattered. Pycnidia few, scattered, amphigenous, sub-erumpent, dark, ostiolate, thick-walled, spherical to ovoid, measure 84—176,4  $\mu$  in diameter. Pycnidiospores elongate to ellipsoid, rounded at both ends, one-celled, hyaline, 5,25—8,4  $\times$  2,2—4,5  $\mu$ .

Inciting leaf-spots of *Desmodium laxiflorum* DC. Collected by Vasant Rao in August 1962 at Poona, India.

##### 3. *Phyllosticta gerbericola* Batista (Batista, Bol. Sec. Agric. Pernambuco. Brazil: 19: 3—4; pp. 212—215, 1952. Abs. in R. A. M., 32: 698, 1953).

Leaf-spots mostly circular to irregular, brownish, epiphyllous, with a dark-brown margin, scattered, few marginal also. Pycnidia epiphyllous, sub-epidermal, ostiolate, spherical to oval, dark-brown,

few per spot, 63–118  $\mu$  in diameter. Pycnidiospores hyaline, elongate, 1-celled, 4,2–8,5  $\times$  3–3,8  $\mu$ . incites leaf-spots on *Gerbera jamesonii* Bolus. collected by Vasant Rao, in August 1962 at Poona, India.

4. *Phyllosticta lycopersici* Peck. (Sacc. 10: p. 131, 1892).

Leaf-spots mostly marginal, dark-brown, epiphyllous, irregular. Pycnidia spherical to globoid, sub-epidermal, ostiolate, dark-brown, 49,4–150,2  $\mu$  in diameter. Pycnidiospores elongate, hyaline, 5,25–8,5  $\mu \times$  3,12–4  $\mu$ .

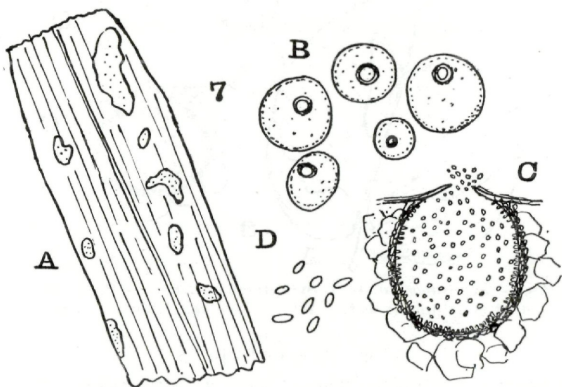


Fig. 7. *Phyllosticta trilobachnes*. — A. Symptoms nat. size. — B. Pycnidia  $\times$  70. — C. Pycnidium in sect.  $\times$  100. — Pycnidiospores  $\times$  440.

On the living leaves of *Lycopersicum esculentum* Mill. collected by Vasant Rao in August, 1962 at Poona, India.

5. *Phyllosticta pisi* West. (Sacc. 3, p. 43. 1884).

Infection spots brownish, irregular, mostly marginal, papery. Pycnidia spherical to oval, mostly scattered, epiphyllous, dark-brown, ostiolate, thick-walled, measure 56,7–126  $\mu$  in diameter. Pycnidiospores small, hyaline, 1-celled, cylindrical, released in a cirrus, rounded at both ends, measure, 4,2–5,25  $\times$  2–3,15  $\mu$ .

Incites leaf-spots of *Pisum sativum* L. collected by Vasant Rao, in July 1962 at Poona, India.

6. *Phyllosticta zae-maydis* Saccas (Saccas: Rev. Path. Veg. 30 (3) 161–196. 1951. Abs. in R. A. M. 31. 280–281. 1952). This fungus causes mostly marginal, long, irregular, dull-brown patches on the living leaves of *Zea mays* L.

Pycnidia spherical to globoid, dark-brown, amphigenous, measure 63–152  $\mu$  in diameter. Pycnidiospores oval to elongate, hyaline, released in cirrus, measure 5–6,7  $\times$  2,73–4,5  $\mu$ .

Collected by Vasant Rao, in June 1962 at Poona in India.



7. *Phyllosticta zinniae* P. Brun. (Sacc. 14, p. 856: 1899).

Leaf-spots small, irregular, brownish, mostly marginal, epiphyllous. Pycnidia brownish, thick-walled, ostiolate, spherical, few, scattered, measure 50,4—102  $\mu$  in diameter. Pycnidiospores oval, hyaline, measure 2,1—3,15  $\times$  4,2—5,25  $\mu$ . On the living leaves of *Zinnia elegans* Jacq. collected by Vasant Rao in August, 1962 at Poona, India.

New Host Records.

1. *Phyllosticta dahliaecola* Brun. (Sacc. 10: p. 129, 1892).

Leaf-spots dirty-brown to dark-brown, mostly marginal, small to large, irregular, epiphyllous. Pycnidia dark-brown, spherical to globose, ostiolate, deep in host tissue, few, scattered, measure 50—185  $\mu$  in diameter. Pycnidiospores elongate, hyaline, rounded at both ends, 5,25—6  $\times$  2,2—4,5  $\mu$ .

On the living leaves of *Dahlia variabilis* Desf. collected by Vasant Rao in June 1961 at Poona, India. This constitutes a new host record in literature.

Although the Poona species has smaller pycnidiospores than *P. dahliaecola* Brun, the differences are not considered significant to justify accomodation of the Poona collection into a new taxon.

2. *Phyllosticta hibiscina* Ellis & Everh. (Sacc. 10, p. 103: 1892).

Leaf spots dirty dark-brown, scattered, small, mostly marginal, epiphyllous, irregular. Pycnidia dark-brown, deep in host tissues, ostiolate, spherical to globoid, 58,8—159,6  $\mu$  in diameter. Pycnidiospores small, hyaline, elongate, 6,3—8,5  $\times$  2,9—4,2  $\mu$ .

On the living leaves of *Hibiscus esculentus* L. Collected by Vasant Rao in August 1961 at Poona, India.

*P. hibiscinae* Ell & Ev. described on *Hibiscus mutabilis* L. has spores, 6—8  $\times$  1,5—2  $\mu$ . The Poona collection agrees with this fungus.

Acknowledgements.

The writer is grateful to Prof. M. N. Kamat, for his keen interest and guidance, to the Director, M. A. C. S., labs, Poona-4, for the facilities and to I. C. A. R., New Delhi, for the award of Senior Research Fellowship. He is also grateful to Dr. F. Petrak for help in Latin diagnosis of new species.

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Autor(en)/Author(s): Rao Vasant Gurunath

Artikel/Article: [The Genus Phyllosticta in Bombay-Maharashtra. 275-283](#)