Studies on Elsinoë and Sphaceloma diseases of plants in Maharashtra (India) — III

By M. J. Narasimhan, D. D. Wani, and M. J. Thirumalachar

(Pimpri, Poona, India)

In the previous paper (Sydowia 1968 in press), the authors gave accounts of several new or unrecorded species of *Sphaceloma* from Maharashtra State. Studies on further collections made are presented in this paper. Type cultures of *S. ixorae* and *Elsinoë zizyphi* have been deposited in ATCC, Rockville, Maryland, Centraalbureau Schimmelcultures Baarn, CMI, Kew, England, and IARI, New Delhi. The herbarium types have been deposited in Herb. Crypt. Ind. Orient, New Delhi, Mycological Collections, Bureau of Plant Industry, Beltsville, Maryland, Instituto Biologico, Sao Paulo, Brazil and Herb. C. M. I., Kew, England.

The authors wish to express their gratitude to Dr. Anna E. Jenkins and Dr. A. A. Bitancourt for several valuable suggestions and advice in preparing this paper.

1) Spotted anthracnose disease of *Ixora* species. (Fig. 1—3).

Ixora arborea Roxb. ex. Sm. occurs in deciduous forests and hilly tracts of Maharashtra State. *Ixora coccinea* L. has similar habit to the above species but has got reddish flowers.

Species of *Sphaceloma* causing anthracnose spotting of leaves and tender shoots of both the host species was collected first from Mahabaleshwar and subsequently from various other localities from Maharashtra State. Detailed studies of the pathogen have indicated that the species is undescribed. The description of the pathogen is given below.

Sphaceloma ixorae Thirum. and Narasimhan. sp. nov.

Foliorum maculae parvae, plures, griseo-albae, dispersae, circulares vel irregulariter angulares, laxae vel aggregatae ad efformadas maculas largiores, vulgo epiphyllae, saepe producentes in pagina inferiore aream fuscam conspicuam, paulum elevatae, circulares vel ovatae, 0.5—2 mm. diam. Acervuli macroscopice apparent in medio macularum singularum ut fusca accum puncta elevata, intraepidermales, erumpentes, 14—28 μ alti, 21—52 μ lati, stromatae hyalino basali producente conidiophoros erectos compacte aggregatos. Conidiophori non septati, fusce rubro-brunnei, 3—4.5 μ longi 1.5—3 mm lati. Conidia non visa.

In follis *Ixorae arboreae* Roxb. ex. Sm. Mahabaleshwar October 19, 1958 (Typus) Leg. M. J. Thirumalachar. In foliis *I. coccineae* L. Koyana valley February 17, 1959, Leg. D. D. Wani, Lonavala February 10, 1962, Leg. D. D. Wani. B. P. I. No. 91563 and 91565 S. P. I. B. No. 10120 and 10122.

Leaf spots small, numerous, greyish-white, scattered all over the lamina, circular to irregularly angular, sparse or aggregated to form patches, chiefly epiphyllous, often showing on the back side as conspicuous dark area. Individual spots slightly raised circular to oval, with 'Iris mauve' centre and dark brown margin, 0.5—2 mm. in diameter. Acervuli visible in the centre of the individual spots as dark raised pin heads, microscopically they are intraepidermal, erumpent, 14—28 μ high and 21—52 μ broad, with hyaline basal stroma giving rise to erect crowded conidiophores. Conidiophores, non-septate, dark reddish-brown. 3—4.5 μ long and 1.5—3 μ broad. Conidia not seen. The organism has been isolated in pure culture from diseased host tissue. Well grown culture of the organism is of raised crustose type, 'Fawn coloured' from above and deep red from the reverse side. The mycelium is branched, producing mumerous, hyaline, oval or spherical microconidia. Occurence of chlamydospores in old cultures is quite frequent. A. T. C. C. Cul. No. 14653.

2) Anthracnose disease of *Balanites roxburghii* Planch.

Balanites roxburghii Planch., is widely distributed in Deccan (India) and produces yellow oil of medicinal importance.

Anthracnose disease inciting severe spotting of the leaves was collected from Law College Hills near Poona (India). The disease incites slight curling of the leaves. Laboratory studies have revealed that the diseases is incited by an undescribed species of *Sphaceloma* for which the name *Sphaceloma balanitidis* has been proposed.

Sphaceloma balanitidis Thirum. and Narasimhan Sp. nov. (Fig. 4 & 5).

Infectionis maculae in foliis et surculis, calcareoalbae, parvae, plures, dispersae, laxae vel aggregatae, amphigenae, secundum nervos; maculae singulae distinctae, circulares vel. oblongae, Zephyr pink colore, centro depresso, 0.5—1 mm. diam. Acervuli macroscopice distincti in maculis singulis, pallide brunnei, elliptici vel oblongi, intraepidermale, 14—27 μ alti, 25—38 μ lati. Conidiophori erecti, compacte aggregati, cylindrici, non-septate pallide brunnei, hebetes ad apices, 3—6 μ × 1.5—3 μ. Conidia non visa.

In foliis et surculis *Balanitidis roxburghii* Planch. August 13th 1957 (Typus), Leg. M. J. Thirumalachar, Poona 14-10-1958; Parvati Hill 25-12-1960; Katraj 27-11-1962. Leg. D. D. Wani.

Numerous, chalky-white leaf spots appear as specks. The spots are small, often restricted along veins and veinlets, epiphyllous at first but later become amphigenous, scattered or aggregated to form crusts by coalescing with each other. Individual spots are distinct, circular to oblong, chalky-white to Zephyr-pink, with depressed centre, measuring 0.5—1 mm. in diameter. Acervuli macrospopically visible in the centre of the individual spots or in areas of aggregation, numerous, dark-brown, elliptic to oblong, intraepidermal, 14—27 μ high and 25—38 μ broad, producing numerous conidiophores from the basal stroma. Conidiophores pale yellow, compactly grouped, cylindrical, non-septate with blunt apices, and measuring 3—6 μ × 1.5—3 μ. Conidia not seen. B. P. I. No. 91548 S. P. I. B. 10105.

3) Scab disease of *Zizyphus.*

Zizyphus rotundifolia (Burm.) W. & A. is common throughout the state of Maharashtra and yields acid flavoured fruits which are eaten on large scale. Scab disease of the fruits, shoots and the leaves was observed and collected in Poona. Subsequently the disease was collected from number of other localities from the state. Detailed examination of the disease revealed that the causal organism is a species of *Elsinoë* for which there is no record in literature. The name *Elsinoë zizyphi* has been proposed. The organism under study in association with *Cladosporium zizyphi* Karst. incites severe damage to the host resulting in early defoliation of its leaves. On fruits *Sphaceloma* stages form hard scabby crusts reducing their market value.

Elsinoë zizyphi Thirum. and Narasimhan Sp. nov. (Fig. 6 to 8).

Infectionis maculae in foliis, caulibus et fructibus. In foliis quidem plures, vulgo ad nervos et nervulos limitatae, circulares vel ovales 0.1 to 1 mm. diam. Maculae singulae ornatae margine elevato nigro-brunneo et centro griseo-roseo depresso, primo epiphyllae, tum acetate maturantae epidermis inferior et mesophyllum decidunt, relicta epidermide superiore tenuissima in qua ascomata fungi notantur. In surculis et fructibus maculae sunt parvae, plures, paulum elevatae, arcte congestae ad efformandas crustas. Ascomata intraepidermalia, erumpentia, insidentia parenchymati vallari folii, constantiae pseudoparenchymate pallide luteo operto seris fusce brunnea cellularum epithecalium. 60—90 × 23—42 μ continente plures ascos irregulariter descributos. Asci globosi, hyalini, ascosporis 4—8 pallide luteis 2—4 cellularibus 6—15 × 3—6 μ, muriformis, utrinque rotandatae. Acervuli status condialis fusce brunnei, intraepidermales, erumpentes, ovales vel elliptici, 18—33 μ lati et 21—28 μ alti ornati stromatae basali pseudoparenchymatico quod conidiophora producit. Conidiophori acte aggregata pyriformia, 4.5—11 μ alti, et 3—6 μ lati, ex quibus producente conidia unicellularia, hyalina, ovalia vel sphaerica, 1.5—3 × 1.5—2.5 μ.

In foliis et surculis et fructibus *Zizyphi rotundifoliae* (Burm.) W. & A. Poona 15th October, 1958 (Typus) leg. M. J. Thirumalachar. — In foliis et surculis et fructibus *Zizphi jujuba* Lam. Ganeshkhind January 10, 1959, Katraj November 30, 1959. Parola November 12, 1960. Tamsawadi December 25, 1962 Leg. D. D. Wani. B. P. I. No. 91584 and S. P. I. B. No. 15141. *Zizyphus vulgaris,* Ganeshkhind (Poona) Dec. 18, 1959. Leg. D. D. Wani, B. I. P. 91582, and S. P. I. B. 10139.

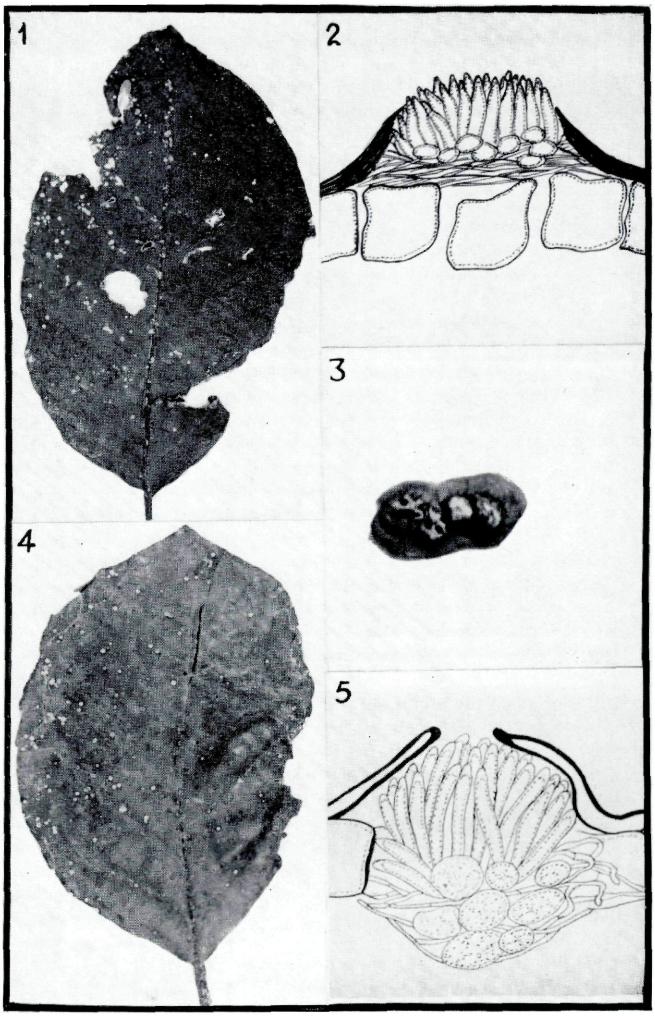
Infections spots on leaves, tender shoots and fruits; on leaves the spots are numerous, generally restricted along veins and veinlets, circular to oval, 0.1 to 1 mm. in diameter with raised blackish-brown margin and greyish-pink depressed centre; epiphyllous at first, but later as the spots mature, the lower epidermis and mesophyll peal off leaving thin membranous upper epidermis on which are seen ascomata of the fungus. On tender shoots and fruits the infections spots are very small, numeros, closely grouped, forming crusts. Ascomata intraepidermal to subepidermal occurring on the top of loose palisade parenchyma and is made of pale yellow pseudoparenchyma covered with dark-brown epithecial cells, 60—90 μ × 23—42 μ, containing number of globose asci. Ascospores, hyaline, 2 to 4 celled, muriform, broader at one end and blunt and rounded on both sides 6—15 μ long and 3—6 μ broad. Acervuli of the conidial stage intraepidermal, erumpent, ovate to elliptic, 18—33 μ broad and 21—48 μ high with basal stroma giving rise to conidiophores. Conidiophores pear shaped, unicellular, pale yellow, 4.5 to 11 μ long and 3 to 6 μ broad, producing spherical to oval, unicellular conidia, measuring 1.5 to 3 μ × 1.5 to 2.5 μ.

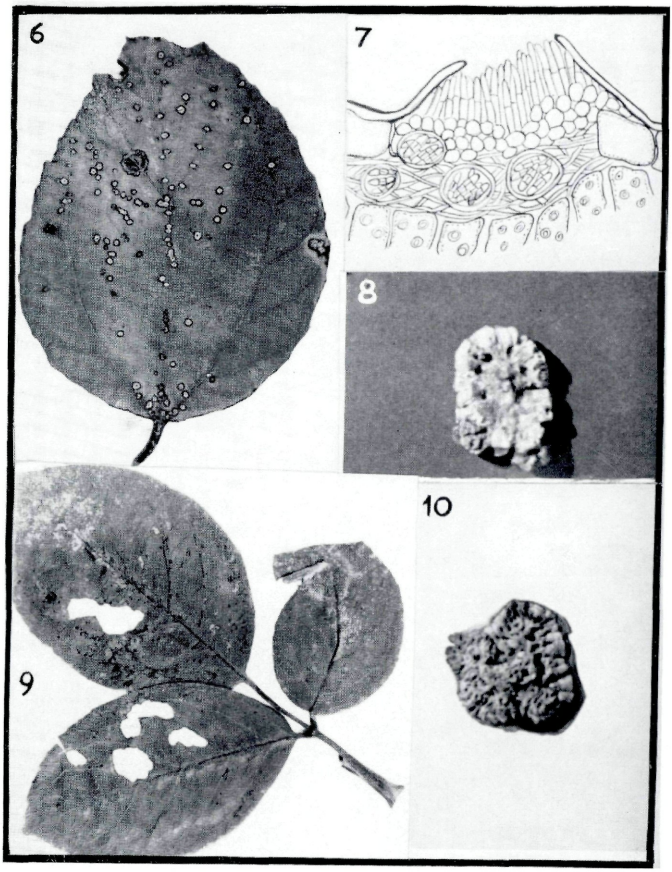
The pathogen was isolated in pure cultre on potato dextrose agar medium. Well-grown culture os the organism showed raised cerebriform type of growth. It is salmon red in colour on reserve side and brownish-red on the upper side.

4) Anthracnose disease of cultivated roses.

Several varieties of rose with flowers of different shades and sizes are cultivated in gardens. Essential oil is often obtained by distillation of flowers and is used in perfumory.

An anthracnose disease of roses is very common and severe in South India, specially on imported rose varieties by means of which the disease might have got introduced into this country. The disease generally appears soon after the outbreak of rains and become epiphytotic by about November. Infection spots occur on leaves and stems causing numerous lesions, resulting in their weakening and poor flower bearing. The fungus is being reported for the first time from India and is identical to *Elsinoë rosarum* Jenkins and Bitance. (1) described by the authors on the same host. However only the conidial stage *Sphaceloma rosarum* (Pass.) Jenkins (2) has been observed.





The fungus was isolated in pure cultree oi potato dextrose agar. It produce an aised cerebriform type of growth. Colonies appear 'Fawn' to red coloured from above and 'Salmon' red' on reverse side. The mycelium is branched septate and produces large number of chlamydospores. *Sphaceloma* stage or microconidia were not seen. A. T. C. No. 15031.

On leaves and stems of *Rosa* sp. Mahabaleshver February 1959, Poona December 10, 1962. Leg. D. D. W a n i.

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Explanation of Plates VII—VIII

Fig. 1: Leaf of *Ixora arborea* showing leaf spotting natural size. — Fig. 2: Camera lucida drawing of the acervulus × 800. — Fig. 3: Growth in artificial culture. Natural size. — Fig. 4: Leaf of *Balanitis roxburghii* showing infection × natural size. — Fig. 5: Camera lucida drawing of acervulus × 800. Fig. 6: Leaf of *Zizyphus rotundifolia* showing numerous lesions × 2. — Fig. 7: Camera lucida drawing of ascomata × 800. — Fig. 8: Growth of the pathogin in artificial culture. Natural size. — Fig. 9: Infected leaf of *Rosa* sp. natural size. — Fig. 10: Growth in artificial culture. Natural size.