Studies on Elsinoë and Sphaceloma diseases of Plants in Maharashtra (India)-IV

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Several tropical members of the Anacardiaceae are of great economic importance since they yield valuable fruits and other commercial products. In India, particularly in Maharashtra, the following trees are widely grown either in plantations or conserved in the forest areas; *Mangifera indica* L. or the mango tree, *Anacardium occidentale* L. or the cashew nut, *Semecarpus anacardium* L. or the marking nut, *Spondias mangifera* Wild, etc. The scab and spot anthracnose diseases of the plants are of considerable economic importance since they may incite early defoliation, scabbing of the fruits or uneven expansion of the maturing fruits and nuts. *Elsinoë mangiferae* Bitanc. & Jenkins has already been reported by Bitancourt & Jenkins (1943) from Brazil, and this disease is prevalent in epiphytotic condition in restricted areas in India. *Sphaceloma spondiadis* Bitanc. & Jenkins was first recorded from Brazil on *Spondias purpurea* L. (Bitanc. & Jenkins 1942) and this was later recorded in India by Thirumalachar (1946) on *S. mangifera*, the fruits of which are used for pickles in India. The *Sphaceloma* species on *Anacardium occidentale* and *Semecarpus anacardium* have been added up in the present studies, both of them being new to science. Cultural studies have been made in case of *Sphaceloma* on *A. occidentale* and *S. anacardium* and detailed accounts of the nutritional requirements, etc. of several *Sphaceloma* species including these ones are being published separately. The type cultures have been deposited in ATCC, Rockville, Maryland, CMI, Kew, England, Centraalbureau voor Schimmelcultures, Baarn 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, and Herb. CMI, Kew, England.

The authors wish to record their gratitude to Dr. Anna Jenkins and Dr. A. A. Bitancourt for the benefit of valuable suggestions and advice in preparing this paper.

(1) Spotted anthracnose disease of cashew-nut.

Anacardium occidentale L. popularly known as cashew is a native of tropical America. In India, it is cultivated as well as naturalized in coastal regions of Maharashtra State. It is one of the most important

export crop of India. Scab disease of cashew was discovered and collected from many localities from State of Maharashtra. It affects leaves, young shoots and fruits. Severe infection may cause premature defoliation, checking normal expansion of peduncles and development of fruits. The species under study differs from *S. semecarpi* Wani and Thirum. on *Semecarpus anacardium* L. and *E. mangiferae* Bitanc. and Jenkins on *Mangifera indica* L. and *S. spondiadis* Bitanc. & Jenkins on *Spondias purpurea* L. both in its type of symptoms produced, and measurement of fruiting bodies. The description of the pathogen *Sphaceloma* as a new species follows.

Sphaceloma anacardii Wani and Thirum. sp. nov.

Maculae anthracnose in foliis, surculis teneribus et pedunculis carnosis; in foliis infectionis maculae plures, griseo-albae, vulgo epiphyllae, producentes, aream fuscam in pagina inferiore, dispersae. Infectio in serculis et pedunculis griseo-alba crustosa. Maculae singulae parvae paulum depressae, polygonales, vel irregulariter angulares, 0.5 to 2 mm. diam. Acervuli plures, circulares vel oblongi, fusce rubro-brunnei, intra-epidermales, 19—31 μ alti, 26—67 μ lati. Conidiophori evoluti ex stromate basali hyalino, erecti, septati, constricti ad parietes transversales, compacte aggregati, apice rotundato 6—12 μ longi et 3—6 μ lati. Conidia non visa.

In foliis, surculis et pedunculis *Anacardii occientalis* L. Malavali September 18, 1958 (Typus). Leg. D. D. W a n i; Lonavala November 1, 1959, Khandala January 14, 1962. Leg. D. D. W a n i.

Anthracnose spots on leaves, tender shoots and fleshy peduncles; on leaves the infection spots are numerous greyish-white specks, chiefly epiphyllous leaving dark area on the lower leaf surface, scattered all over the lamina, more often aggregated near lateral veins; showing coalescence with one another. Infection spots on shoots and peduncles greyish-white, elongated, closer showing more tendency fo coalescence and forming scabby lesions. Individual spots small, slightly depressed, polygonal to irregularly angular, 0.5 to 2 mm. in diameter; acervuli numerous, dark reddish-brown, circular to oblong, intraepidermal, appearing subcuticular when erumpent, 19 to 31μ high and 26 to 67 μ broad. Conidiophores erect, two to three septate with slight constriction at cross walls, crowded in heaped up masses, with rounded apices, 6 to 12 μ long and 3 to 6 μ broad. Conidia not seen.

The fungus has been isolated in pure culture on potato dextrose agar medium from diseased host tissues. Well grown culture is of raised convolute type and produces cottony white aerial mycelium. It has 'Killarny green' margin and 'Fairly green' colour on the reverse side. Mycelium is branched and septate. Production of microconidia has not

been noted but in old cultures typical *Sphaceloma* stage is of common occurrence.

*) Colours as per 'Dictionary of colours' by Maerz & Paul.

(2) Anthracnoses disease of mango.

In India, regarded as home of mango, a large number of varieties grown in different parts of the country. In Maharashtra State alone, the culture comprises about one lakh (100.000) acres. Varieties grown in this state are classified by Burns and Prayag in three groups; long fruited, round fruited and indefinite shaped. The most popular commercial varieties are 'Alfonso' and 'Pairi'.

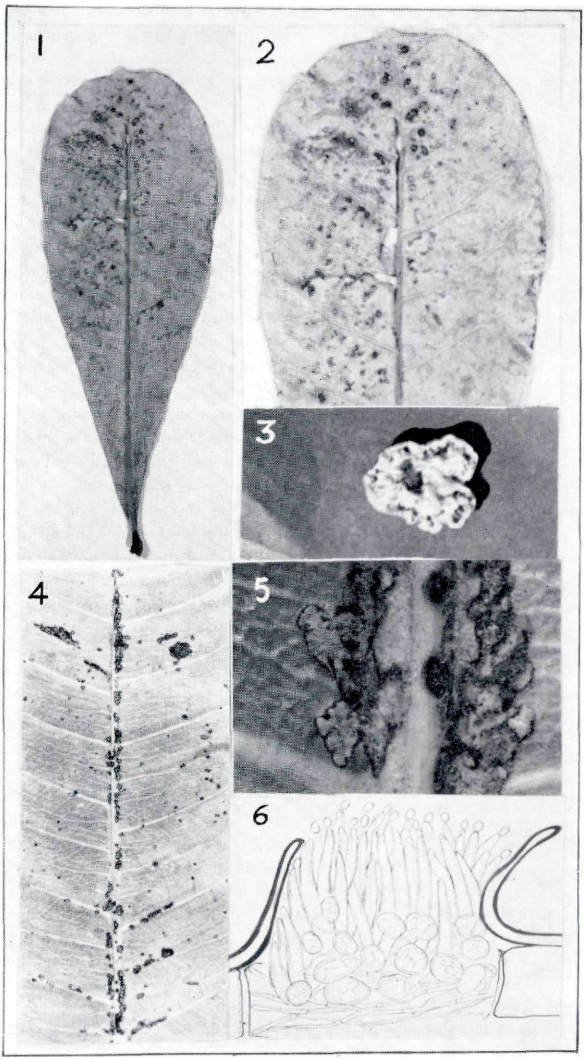
In surveying for mango scab in Maharashtra State, it was discovered that the disease is wide-spread in the state. Commercial varieties, often affected are 'Alfonso'. 'Neelam', 'Pairi' and 'Rajapuri'. Through its attack on tender shoots, fruits and leaves, the scab causes appreciable damage. Associated with the leaf scab damage is caused by *Cercospora mangiferae* Koord. and *Pseudomonas mangiferae* Patel & Moniz. This is the first report of mango scab from India. The disease has been known for some time in tropical America. Only *Sphaceloma* stage of the pathogen of mango scab was observed on the representative specimes collected in Maharashtra State.
Sphaceloma mangiferae Bitanc. & Jenkins, the description of which follows:

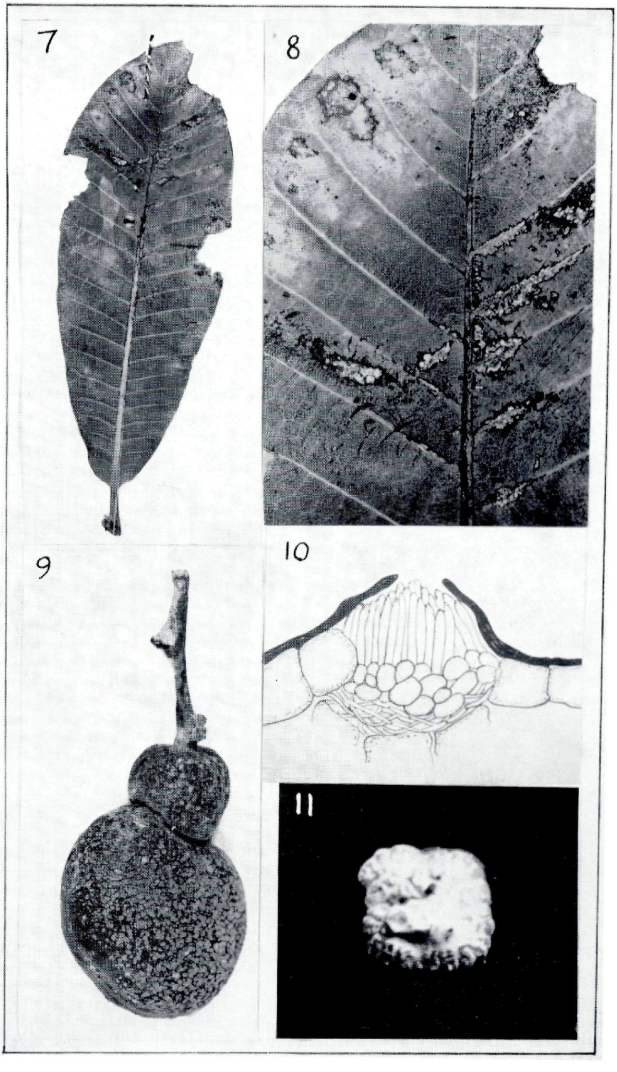
On leaves the spots are small, round to oval, slightly elevated, greyish-pink, 0.5—2 mm in diam. On young shoots the spots are small, closely grouped to form larger patches of crusts. Individual spots circular to oval, isolated or more often concentrated along midrib and lateral veinlets, 1—2 mm. in diam. Acervuli macroscopically visible in the centre of indvidual spots or in areas of aggregation in the form of dark raised pin heads, intraepidermal, in immature stage but later appear subcuticular due to erumpence, dark-reddish-brown, elliptic to lenicular, measuring 15—30 μ in hight and 23—52 μ in breadth. Conidiophores produced from basal stroma erect, crowded in heaped up form, producing conidia at apices, 4.5—9 μ × 3—4.5 μ Conidia small, hyaline, spherical to elliptic, 1.5—3 μ × 3 μ. Ascigerous stage not seen.

Habit — On leaves, shoots and fruits of *Mangifera indica* L. College of Agriculture, Poona, December 1960. Ratnagiri January 1961, Nandgaon Febuary 10, 1962. Leg. D. D. Wani.

(3) Scab disease of *Semecarpus anacardium* (Marking nut).

Semecarpus anacardium commonly known as marking nut is distributed in dry forests of Maharashtra State. The moderate sized tree bears ovate-oblong leaves whith rounded apices. The drupaceous fruits are





seated on fleshy receptacles. The numerous uses of the fruit indicate the high economic importance of this plant. Juice of the pericarp is used in marking clothes. An acrid juice, obtained from the pericarp yields a high percentage of an oil that blackens upon exponsure to air. This is used in coating floors and rafters. A kernel oil, remarkably sweet, edible and wholesome, it used in pharmaceutical preparations.

The scab disease was first noticed in January, on plants growing in Poona. Subsequently it was observed in various other localities, indicating its probable widespread distribution in Maharashtra State. Leaves, stems and fruit are affected. Severely attacked leaves become malformed and distorted. The pathogen is described as a new species of *Sphaceloma:*

Sphaceloma semecarpi Wani and Thirum. Sp. nov.

Infecto in foliis apparens ut crustae griseo-albae secundum nervum medium et nervos laterales, crustosa apparentia acervationis, paulum elevata, producens depressionem in pagina inferiore foliorum. In surculis teneribus infectio et in fructibus griseo-alba crustosa. Acervuli plures, dispersi, intra-epidermales, erumpentes, 10—24 μ alti, 18—39 μ lati, cellulis basalibus stromatis compacte aggregatis, conidiophoris clavato-cylindricis ordinatis in textibus vallaribus, 4—9 μ long, 3—4.5 μ lati. Conidia non visa.

In foliis et surculis teneribus et fructibus *Semecarpi anacardii* L. Law College Hill, Poona. Die Januarii 1 anni 1959 (Typus). Leg. D. D. W a n i. Pimpri 22-11-1960. Khandala 10-1-1961. Satpuras 26-12-1962. Leg. D. D. W a n i.

Infection spots on leaves appearing as greyish-white crusts, often occurring along midrib and lateral veins or in between lateral veins. Along midrib the spots are crustose with heaped up appearance, slightly raised leaving depression on the back side. In beween lateral veins the spots are sparse to aggregate mostly occurring along leaf margin. Infection on tender shoots and fruits, greyish-white crustose. Individual spots small, raised, whith greyish-white centre and 'Beryl blue' margin, 0.5 to 5 mm. in diameter. Acervuli numerous, epiphyllous, reddish-brown, intra-epidermal, scattered, erumpent, 10—24 μ high and 18—39 μ broad, basal cells of the stroma compactly grouped, conidiophores clavate-cylindrical, arranged in palisade layer, 4—9 μ × 3—4.5 μ. Conidia not seen.

The fungus was isolated in pure culture from diseased host tissue. Colonies after 15 days incubation period are raised, crustose, fawn coloured from above and salmon red on the reverse side. In younger cultures numerous hyaline micro-conidia are seen while in older cultures large number of chlamydospores and typical *Sphaceloma* stage are formed.

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Plate IX: Fig. 1. Leaf *Anacardium occidentale* showing anthracnose spotting. Natural size. — Fig. 2. Enlarged view of the same × 3. — Fig. 3. Artificial culture of *Sphaceloma anacardii*. Natural size. — Fig. 4. Part of *Mangifera indica* leaf showing anthracnose spotting. Natural size. — Fig. 5. Enlarged view of anthracnose spots. × 25. — Fig. 6. Drawing of the acervulus of *S. magniferae* × 800.

Plate X: Fig. 7. Leaf of *Semecarpus anacardium* showing infection spots. ½ Natural size. — Fig. 8. Enlarged view of infection spots. × 5. — Fig. 9. Fruit of *S. anacardium* showing infection. × Natural size. — Fig. 10. Acervulus of *S. semecarpii*. × 800. — Fig. 11. Growth of *S. semecarpi* in artificial culture. Natural size.