

**GLOMERELLA PSIDII (DEL.) SHELD. AND
PESTALOTIA PSIDII PAT. ASSOCIATED WITH
A CANKEROUS DISEASE OF GUAVA**

BY N. S. VENKATAKRISHNIAH

(Assistant Plant Pathologist, Mysore Agricultural Department, Bangalore)

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A CANKER or scab of guava fruits (*Psidium guajava* L.) occurs seriously in Mysore on several local and grafted varieties. *Colletotrichum* and *Pestalotia* are observed on the affected fruits and leaves. *Colletotrichum* and *Glæosporium* on guava fruits have been mentioned by Narasimhan (1931-40) in Mysore. *Colletotrichum psidii* according to Dey (1934) occurs in the United Provinces and according to Mehta (1951) in Uttar Pradesh. *Pestalotia psidii* on guava has been reported by Patel, Kamat and Hingorani (1950) at Poona. Curzi (1927) describes *Colletotrichum psidii* on leaves of guava in Italy. Ocfemia (1931) reports that *Glomerella psidii* in the Philippines is very similar to *Glomerella cingulata* (Stonem.) S. and v. S. According to Shear and Wood (1907), Sheldon obtained the ascogenous stage of the guava anthracnose *Glomerella psidii* (Del.) Sheldon in pure cultures. There appears to be no record of *Glomerella psidii* in India. Since various organisms are associated with the canker of guava, it was thought desirable to investigate the exact cause of the disease.

Symptoms.—The characteristic symptom of the disease is the development of canker on young green and mature fruits. Small circular spots appear on buds, calyx and leaves. The spots enlarge, turn black or brown and unite with one another. In severe cases raised, cankerous spots develop in great numbers and the fruit breaks open to expose the seeds (Fig. 1). The infected fruits remain undeveloped, become hard, malformed and mummified. They drop in great numbers. Sometimes small, rusty brown, angular spots appear on the leaves (Fig. 2).

Isolation.—Repeated attempts to isolate the fungus from infected young buds and calyx were of no avail. The two fungi were isolated in November 1949 from leaves and fruits. *Colletotrichum* and *Pestalotia* both appeared sometimes from the same bit, one overgrowing the other and sometimes individually.

Colletotrichum psidii grew well on oat and potato dextrose agars, but thin on maltin agar. The acervuli were black, round and gregarious. Setæ were not constant. The conidia were salmon-coloured in mass but hyaline singly, unicellular, granular, vacuolate, rounded at both ends, sometimes slightly curved, and measured $10-24 \times 3.5-7 \mu$. They germinated readily in water, more so in tap than in distilled water. The germ tube put forth characteristic appressoria. Perithecia developed on oat and maltin agars at laboratory temperature in four weeks. They were dark coloured, globular, paraphysate and measured $112-192 \times 176-288 \mu$ on oat agar. The asci (Fig. 5) were numerous, hyaline, sessile, thin walled, clavate or sub-cylindrical and measured $31.5-68 \times 8-13.5 \mu$. The ascospores (Fig. 6) were eight in number, elliptical, sometimes slightly curved, hyaline, unicellular, granular and measured $13.5-20.5 \times 4-8 \mu$. The perithecial stage of certain species of *Glomerella* has been observed only on host tissues and of certain other species only in artificial cultures. The perfect stage of the fungus on guava has not been observed in Nature. That obtained in culture is similar to *Glomerella psidii* reported by Ocfemia (1931) and Shear and Wood (1907).

Pestalotia psidii grew well on oat agar. The mycelium made a thick, pure white, cottony growth and acervuli developed as black, shining, moist crusts in cultures. The conidia were spindle shaped, dark coloured in mass and 5-celled. The upper end conical cell bears usually 3 long, slender, colourless, simple appendages. 2-5 are sometimes met with. The appendages measure $7-17 \mu$ long and the conidia $17-24 \times 5-7 \mu$ on the host. The conidia germinated readily in sterile distilled water in 3 hours, usually from the hyaline end cells.

Inoculation Experiments.—Inoculations with the two fungi from pure cultures were conducted under aseptic conditions on fresh, young, green guava fruits and leaves of several grafted “Banaras”, “Bangalore” (pear-shaped), “Allahabad”, “Safeda”, and grafted (seedless) varieties obtained from Hessarghatta Fruit Research Station. The twigs bearing the fruits and leaves were left standing in water or in 2.5% sugar solution and covered with big bell jars. 40-60 fruits of about the same size borne on a grafted tree were inoculated under aseptic conditions with the two fungi. The inoculated fruits and leaves on the tree were covered with moist cotton wads and wrapped loosely with waxed paper bags. Conidia of *Colletotrichum* and *Pestalotia* from single conidium cultures were suspended separately in sterile distilled water. The two suspensions were placed individually and in combination within marked regions on the upper and lower surfaces of leaves and on the fruits. Some were inoculated by placing the two suspensions very close together on the same fruit. The inoculated regions of some fruits

were injured by pinpricks and kept moist by atomizing water for 4-5 days. Both the fungi infected readily the fruits and leaves of all the varieties except "Allahabad", "Safeda" and grafted (seedless) fruits.

The regions of fruits inoculated with *Colletotrichum* developed a water soaked appearance and the spots extended in diameter in 8-10 days. The tissue beneath turned brownish in colour. Leaves inoculated on the lower surface took a pinkish colour at first and then turned brownish in 6-8 days. Conidia of *Colletotrichum* were observed in abundance. Sections of the tissue showed the mycelium. The fungus was reisolated and resembled the original isolation.

There was a fluffy growth of the mycelium at the regions inoculated with *Pestalotia*. Sections of the infected regions showed the mycelium in the tissue. The leaves inoculated on the lower surface took the infection 2-3 days earlier than those inoculated on the upper surface. The infected regions turned dark brown and varied in size from 2 to 10 mm. in 8 days (Fig. 4). Conidia of *Pestalotia* were observed on the infected spots, more predominantly on the fruits. The inoculated fruits turned black and remained hard for over 20 days. This symptom corresponded to that observed in Nature. The fungus from the inoculated leaves and fruits was reisolated and was found to resemble the original isolation.

Either *Pestalotia* or *Colletotrichum* predominated when both the fungi were inoculated together on the same fruit, one fungus soon outgrowing the other. The controls remained healthy.

Inoculation experiments were conducted in the laboratory under aseptic conditions with the two fungi on young fruits of apple (*Pyrus malus* L.), brinjal (*Solanum melongena* L.), chilly (*Capsicum annuum* L.), French bean (*Phaseolus vulgaris* L.), lemon (*Citrus aurantifolia* Swingle), mango (*Mangifera indica* L.), papaya (*Carica papaya* L.), plantain (*Musa sapientum* L.) and tomato (*Lycopersicum esculentum* Mill.). The infection by *Pestalotia* was not observed on any of the fruits. Infection by *Colletotrichum* was observed on apple, chilly, lemon, mango, papaya, plantain and tomato, but not on brinjal and French bean. It was characteristic on apple fruits. The infected circular spot extended gradually with a dark brown discolouration. It was more rapid on tender yellowish white fruits of papaya than on small green fruits. Conidia of *Colletotrichum* were observed in abundance at the inoculated regions. The controls were healthy. This confirms the work of Ocfemia (1931) in Philippines who succeeded in infecting chilly, egg plant, tomato, avocado, banana and mango with *Glomerella psidii*.

Patel, Kamat and Hingorani (1950) were not successful in artificially infecting the leaves of guava with *Pestalotia psidii* Pat. But the author's experiments conducted with both the fungi showed infection readily on the injured fruits and leaves (Figs. 3 and 4) in 4 or 5 days except on the fruits of "Allahabad", "Safeda" and grafted (seedless). The virulence varied with the varieties. The incidence of infection was 66 per cent. with *Pestalotia* and 57 per cent. with *Colletotrichum*.

CONCLUSION

Colletotrichum psidii Curzi and *Pestalotia psidii* Pat. appear to be weak parasites infecting readily the fruits and leaves of guava injured by pinpricks. In Nature the insect *Helopeltis* which is commonly met with in gardens probably causes the initial injury on fruits and leaves. The infection by fungi follows later on. I am thankful to Dr. M. Puttarudriah, Senior Assistant Entomologist of this Department, for the information that his experiments with the species *Helopeltis antonii* Signoret produced the disease symptoms on guava fruits and leaves in Mysore. Hopkins (1950) states that leaf spot, and fruit scab due to *Pestalotia psidii* follows insect punctures by *Helopeltis sanguineus*. Leach (1935) has shown that a stem canker, an angular spot a fruit scab and a fruit rot of mango are caused by the bug *Helopeltis bergrothi* Reut. and that the symptoms are similar to those caused by many fungi and bacteria.

Control.—Narasimhan (1938–40–41) and Venkatarayan (1937) report the experiments done to control the disease. The spraying experiments with 1% Bordeaux mixture and lime sulphur solution diluted 1:25 were conducted on a block of 25 plants in a garden near Bangalore in 1949–50. All the cankered fruits and leaves, mummies, dried and dropped fruits were collected and destroyed before the treatment. Three to four sprayings at intervals of 15 days were given when the fruits began to set. The infection which was confined to a few plants in a corner of the garden at the time of the first spraying did not spread to other sprayed trees. The sprayed plants produced good sized fruits.

SUMMARY

The cankerous disease of guava (*Psidium guajava* L.) exhibiting characteristic spots and malformations is prevalent in Mysore. It is associated with two fungi *Colletotrichum psidii* Curzi and *Pestalotia psidii* Pat.

Colletotrichum psidii developed a perithecial stage in pure culture for the first time in India. The perithecia are globular, dark coloured, paraphysate. Asci are numerous, hyaline and the ascospores are 8 in number, unicellular and granular. This stage corresponds closely to *Glomerella psidii* (Del.) Sheld.

Colletotrichum psidii infected the fruits of apple, chilly, lemon, papaya, plantain, mango and tomato and not brinjal and French bean. *Pestalotia psidii* did not infect any of these hosts. Both the fungi infected the injured fruits and leaves of guava.

Colletotrichum psidii is a general parasite while *Pestalotia psidii* is specialised to guava.

Three or four sprayings with 1% Bordeaux mixture or with lime sulphur solution 1:25 done at intervals of 15 days at an early stage of infection controls the spread of the fungi.

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EXPLANATION OF FIGURES

- FIG. 1. Naturally infected guava fruits showing the cankerous spots and splitting.
- FIG. 2. Naturally infected guava leaves showing numerous spots.
- FIG. 3. Guava leaves inoculated with
- A. *Pestalotia psidii* and
 - B. *Colletotrichum psidii* both showing the infection.
- FIG. 4. Fruits of a grafted variety (Bangalore) showing the characteristic infection within marked regions after inoculation with :—
- A. *Pestalotia psidii* isolated from fruit and
 - B. that of leaf.
 - C. *Colletotrichum psidii* from fruit.
 - D. *Colletotrichum psidii* from leaf and
 - E. a naturally infected fruit.
- FIG. 5. Microphotograph of a perithecium and extruded asci, $\times 280$.
- FIG. 6. Microphotograph of three asci showing ascospores, $\times 680$.

