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A SCLEROTIAL DISEASE OF *PENTAS CARNEA* BENTH.

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IN October 1928, a number of full grown plants of *Pentas carnea* grown in a bed in the economic nursery of the Royal Botanic Gardens, Peradeniya, was found to be diseased. The roots and lower portions of the stems were not affected and no plants were found which had been completely killed. Lesions were present on the stems, at first crimson red, then purple to dark-purple and sunken, with a distinct, thin, dark reddish-brown margin. On the leaves diseased patches, purplish-green on the upper surface and reddish-brown on the lower surface, were present and the diseased tissue was separated from the green healthy tissue by a distinct margin on the upper surface. Fungus hyphae were present over the surface of the diseased plants, on leaves, shoots and stems. A silky, pale-brown web of mycelium completely enveloped the green stems. Sclerotia of a fungus were found scattered over the diseased areas. These bodies were purple-brown in colour, pitted, irregular in shape, flattened usually at the point of attachment, small and attaining a diameter of about 0.5 millimetres. They occurred singly or grouped together and were also found on the hyphae which ran along the green healthy stems. In shape and external characters they resembled the sclerotia of *Rhizoctonia Solani* as found on *Dolichos Hosei* (*Vigna oligosperma*), paddy, maize and groundnut but were smaller. The superficial hyphae were hyaline or light-brown in colour, branched and from 6 to 11 microns in diameter. Where a branch was given off from a main hypha the base of the former was usually constricted. A loose net-work of hyphae was present on the lower surfaces of the diseased leaves. These hyphae were of the same dimensions as the superficial hyphae on the stems but had short septate branches.

The fungus appeared to spread from plant to plant by contact. No fructifications were found.

CULTURES.

In order to establish a connection between the superficial hyphae on the stems, the sclerotia found on the surface and the hyphae on the lesions, fragments of diseased tissue underlying the lesions, the hyphae on the stems and individual sclerotia were

taken into culture on maize meal agar. Pure cultures were obtained and in every case the hyphae grew adpressed to the surface of the culture medium forming a strong superficial film of mycelium. Sclerotia were produced in about five days. The hyphae varied in diameter from 6 to 12 microns with the typical *Rhizoctonia* constriction of the branches at the point of origin. As the culture became older the medium changed from a white colour to dark-brown due possibly to the hyphae in old cultures turning brownish. The sclerotia varied in diameter from 0.5 mm. to 4.0 mm.; a few were typically pitted but the majority were covered with a loose felt of matted hyphae. They were produced singly on the surface of the culture medium and on the hyphae which had ascended the sides of the culture tube or were aggregated to form irregular masses. In section they showed no differentiation into cortex and medulla, the pseudoparenchymatous structure being uniform throughout.

INOCULATIONS.

Inoculation experiments were carried out on the leaves, stems, and shoots of well-grown *Pentas carnea* plants in order to test the parasitism of the fungus. Seedlings of French bean (*Phaseolus vulgaris*), cow-pea (*Vigna catjang*) and cotton (*Gossypium* sp.) which have been proved to be susceptible to the attack of *Rhizoctonia Solani* isolated from *Vigna*, paddy and groundnut (1) were also inoculated with the *Pentas* fungus in order to ascertain whether the latter fungus resembled the other strains in pathogenicity.

1. *Pentas carnea* plants were obtained apparently free from disease and established in pots of sterilised soil in the laboratory. The pots were placed in a glass cage and the plants were inoculated. A culture on maize meal agar containing growths of hyphae only was mixed with distilled water and drops of the mixture were placed on the leaves, flowers, shoots and stems. Two days after inoculation, the points of inoculation of the leaves, flowers and shoots turned black in colour, the hyphae having invaded the tissues and set up a rot. On the following day greenish-brown spots were numerous on the leaves and greenish-brown patches were formed by the coalescing of individual spots. Two days later the leaves which had turned dark-brown or almost black were practically dead and the green stems were enveloped by a film of mycelium similar to that on the diseased plants in the nursery. The control plants which remained healthy were now inoculated by placing diseased leaves of *Pentas* picked from the nursery in contact with healthy leaves. Positive infection was observed after six days. Heavily infected plants were taken out of the inoculation chamber and placed under shade in the open. In about a fortnight's time the plants appeared to have shaken off the disease and produced new shoots below those which were killed.

2. French bean seeds were sterilised in corrosive sublimate solution and sown in pots of sterilised soil. Fifteen seeds germinated. The seedlings were about five inches high after eight days, and at this stage stem inoculations were made on eight seedlings by placing a piece of maize meal agar culture containing growths of hyphae in contact with the stem at ground level. After inoculation the pots were placed in a glass cage. After five days a brownish discoloration appeared at the points of inoculation of five seedlings and a yellowish liquid was exuded from the discoloured areas. On the evening of the same day the seedlings collapsed. On the following day the remaining three inoculated seedlings behaved similarly. Six days later infection spread by contact to three of the uninoculated control seedlings. The control seedlings in another pot remained unaffected.

3. Cotton seeds were surface-sterilised similarly and sown in pots of sterilised soil. Fifteen seedlings about two to three inches high ten days after sowing were inoculated by placing pieces of culture medium containing hyphae in contact with the stems at ground level. In three days the stems at the inoculated points turned pale yellow-brown and five seedlings collapsed at the discoloured areas. Drops of pale-yellow liquid were exuded from the diseased areas. In another three days seven more seedlings collapsed. The remaining three seedlings became typically discoloured at the point of inoculation but were not killed, the lesions drying up.

4. Seedlings of cowpea (*Vigna catjang* var. *sinensis*) were inoculated at ground level in a similar manner. All were infected after three days.

THE FUNGUS.

The mode of growth of the *Pentas* fungus in culture on maize meal agar and the morphological characteristics of the hyphae and sclerotia were identical with the mode of growth and the morphological characteristics of *Rhizoctonia Solani* from *Dolichos Hosei*, paddy and groundnut when grown on the same medium (1).

The sclerotia of *Rhizoctonia Solani* from *Pentas* in nature were smaller than those of the same fungus occurring naturally on the other plants named above. In pathogenicity the *Pentas* strain resembled the other strains and was shown to be capable of attacking French bean, cowpea and cotton seedlings and of causing them to damp off.

CONCLUSION.

Rhizoctonia Solani is here recorded as the cause of a leaf and stem disease of *Pentas carnea*. Inoculation experiments demonstrate that the fungus can attack the leaves, flowers and shoots of the plant, but that it does not usually kill the plant. As no fructification of the fungus *Corticium vagum* was found on the stems and

leaves it was assumed that infection had occurred from sclerotia in the soil. It is possible that infection may have taken place by wind-blown spores of *Corticium vagum* from another source.

Gadd and the writer (1) during the course of the inoculation experiments which they carried out with this fungus noted that the fungus was very susceptible to moisture conditions and that infection occurred readily when atmospheric conditions were moist. Conditions which were ideal for the fungus were found in the nursery which was situated on flat land, shaded on one side by a row of big trees, and in which the *Pentas* plants were very closely planted in a bed.

Cutting off and burning diseased stems and leaves of *Pentas* affected with the fungus, the collection of fallen leaves found on the bed and thinning out the plants should reduce the attack considerably.

REFERENCES.

1. Gadd, C. H. and Bertus, L. S.—*Corticium vagum* B. and C. The cause of a disease of *Vigna oligosperma* and other plants in Ceylon. Ann. Roy. Bot. Gardens. Peradeniya (The Ceylon Journal of Science), XI, pp. 27-49, 1928.