

A SEEDLING DISEASE OF GROUNDNUT CAUSED BY TWO SPECIES OF PYTHIUM

P. SUBRAHMANYAM*, C. S. K. VIJAYA KUMAR** AND A. S. RAO

Department of Botany, Nagarjuna University, Guntur 522 510

ABSTRACT : A severe seedling disease of groundnut was observed in Guntur (A. P.), during the rainy season of 1976. From the studies on symptom development, isolation of suspected pathogens, infectivity, and host range, it was concluded that this disease is caused by either *Pythium myriotylum* or *P. butleri*.

In the *Kharif* season of 1976, a severe seedling disease of groundnut (*Arachis hypogaea* L.) leading to 3 to 25 per cent reduction in stand was observed in Guntur (A. P.). Unemerged seedlings showed decay of cotyledons and primary root. A loose mat of white mycelium covered the surface of the rotting tissue. Severely infected seeds were reduced to a dark brown pulpy mass. The infected emerged seedlings were stunted with pale green leaves which subsequently turned brown, dried up and were shed. The root system was greatly reduced due to rot of lateral, fibrous and tap root from the terminal portion. The root system was soft and clumped. In advance stages, the cortical tissue turned brown and disintegrated leaving a nonfunctional vascular skeleton.

MATERIAL AND METHODS : A large number of infected seedlings were dug, washed and the suspected pathogens were isolated on potato dextrose agar (PDA) and multiplied on oatmeal-sand (5 : 95, W/W) for 10 days. Pathogenicity studies were conducted at 25-30°C. The various inoculum types were ground in a blender, mixed with autoclaved garden soil at the ratio 10 : 90 (W/W) and the mixture put in clay pots. Soil for the control pots was prepared in the same way except fungus free oatmeal-sand and soil mixture were used. Groundnut (var. TMV-2) seeds were surface sterilized with 0.1 per cent mercuric chloride solution and sown in infested soil at the rate of 5 seeds per pot. For pre-emergence seedling rot, one hundred seeds were sown and stand counts were made two weeks after seedling. Root rot was studied by transferring 10 day old seedlings, raised on sterile sand, into clay pots containing the inoculum types.

Effect of plant age on root rot development was also studied. Seeds were sown in sterile sand on different days and 100 apparently healthy seedlings were transplanted simultaneously into pots containing the inoculum types so that all the plants were exposed to the same level of inoculum.

Seedlings of a number of crop plants which are generally grown in rotation with groundnut crop were raised on sterile sand and transplanted into infested soil when they were 10-12 day old. In all root rot studies, stand count and disease severity were noted 20 days after transplanting.

Present address : *International Crops Research Institute for the Semi-Arid Tropics, (ICRISAT), Patancheru P. O. Andhra Pradesh 502 324.

**Plant Quarantine and Fumigation Station, 335 Beach Road, Tuticorin, Tamil Nadu 628 001.

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RESULTS AND DISCUSSION : The frequency of isolation of different fungi from diseased groundnut seedlings is given in Table 1. In most cases one of two species of *Pythium* was isolated. These were identified as *P. butleri* Subramaniam (IMI-209003) and *P. myriotylum* Drechsler (IMI-209566) by Stamps of the Commonwealth Mycological Institute, England. In some cases *Rhizopus stolonifer* (Ehr. ex Fr.) Lind. and *Rhizoctonia solani* Kühn. were also isolated but pathogenicity tests were negative. *Pythium butleri* was isolated in high percentage from the seedlings with pre-emergence rot whereas *P. myriotylum* was isolated from root rot tissues with higher frequency (Table 1).

TABLE 1 : Frequency of isolation of different fungi from surface sterilized diseased tissues of groundnut

Diseased tissue	Percentage isolation of				
	<i>Pythium butleri</i>	<i>P. myriotylum</i>	<i>P. butleri</i> + <i>P. myriotylum</i>	<i>Rhizopus stolonifer</i>	<i>Rhizoctonia solani</i>
<i>Pre-emergence</i>					
<i>Seedling rot</i>					
Cotyledons	82*	10	3	5	0
Primary root	80	12	5	3	0
<i>Root rot</i>					
Tap root	10	85	2	0	3
Lateral roots	5	92	1	0	2

*Figures represent number of times the fungus was isolated from 100 pieces of diseased tissues plated on PDA.

Pathogenicity studies with *P. butleri* gave 100 per cent pre-emergence groundnut seedling rot and 45 per cent seedling mortality due to root rot in transplanted seedlings. On the other hand *P. myriotylum* caused 38 per cent pre-emergence seedling rot and 92 per cent seedling mortality in transplanted seedlings. Transplanted seedlings were healthy for 5 days but by the 8th day most of them showed root rot symptoms and died within 15 days. In contrast to control plants new root growth was not seen in plants in *Pythium* infested soils, not even in the plants which survived. On surviving plants some degree of root discoloration was evident. The *Pythium* spp. were reisolated from these discoloured tissues.

In both species the percentage mortality was much less in older plants (Table 2) particularly for those infected with *P. butleri*. There was some degree of rotting of lateral roots on plants up to 30 days old, which showed no above ground symptoms, but no signs of root rotting could be found on roots of 35 day old plants.

The following crop plants were included in host range studies : *Cajanus cajan*, *Cicer arietinum*, *Dolichos lablab*, *Phaseolus mungo*, *Pisum sativum*, *Cyamopsis tetragonoloba* (Papilionaceae); *Citrullus vulgaris*, *Cucumis melo*, *C. sativus*, *Cucurbita pepo*, *Lagenaria vulgaris*, *Luffa acutangula*, *Momordica charantia*, *Trichosanthes anguina* (Cucurbitaceae); *Abelmoschus esculentus*, *Hibiscus cannabinus* (Malvaceae); *Brassica campestris*, *B. oleracea* var *caulorapa* (Cruciferae); *Allium cepa* (Liliaceae); *Capsicum*

TABLE 2: Effect of groundnut plant age on mortality due to root rot in soil infested with *Pythium butleri* and *P. myriotylum*

Pathogen	Plant age in days ^a				
	15	20	25	30	35
<i>P. butleri</i>	24 ^b	2	0	0	0
<i>P. myriotylum</i>	78	28	5	2	0

a. One hundred plants were tested in each case

b. Figures represent per cent mortality due to root rot.

annuum, *Lycopersicon esculentum*, *Nicotiana tabacum*, *Solanum melongena* (Solanaceae). *Pythium butleri* caused root rot on all the crop plants tested except *Allium cepa* (Onion), whereas *P. myriotylum* caused root rot in all test members of the Papilionaceae, Cruciferae and Solanaceae and two members of the Cucurbitaceae (*Citrullus vulgaris* and *Lagenaria vulgaris*). In general *P. butleri* was more aggressive, causing 100 per cent mortality in many cases. Both *P. butleri* and *P. myriotylum* are already known to infect a wide range of crop plants (Middleton, 1943; Butler and Bisby, 1960; Sarbhoy *et al.* 1975, 1980; McCarter and Litterell, 1968, 1970). These results indicate that these two organisms are potentially dangerous as pathogens not only on groundnut but also on some of the crops which are generally grown in rotation.

Pythium myriotylum is known to cause seed rot, root rot, vascular wilt, damping-off and pod rot or pod breakdown in groundnut in other countries (Garren and Jackson, 1973). So far, a number of other *Pythium* species like *P. ultimum* Thow., *P. debaryanum* Hesse. and *P. irregular* Buisman are reported to be pathogenic on groundnut (Garren and Jackson, 1973; Jackson and Bell, 1969; Feakin, 1973 and Raghunathan, 1970). *Pythium aphanidermatum* (Syn. *P. butleri*) was also reported to infect groundnut on artificial inoculations (McCarter and Littrell, 1970). This is the first report of a disease of groundnut caused by *P. myriotylum* and *P. butleri* in India.

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