TECHNICAL NOTES.

A LUCERNE ROOT ROT CAUSED BY PYTHIUM MYRIOTYLUM.

The sandy sub-coastal lowlands of south-eastern Queensland are characterised by soil conditions that adversely affect the establishment of pastures and fodder crops. As well as being poor in plant nutrients, the soils of this region are frequently subject to waterlogging and often lack the appropriate strains of *Rhizobium* for introduced legumes. Since November, 1954, a further adverse factor has become evident in the infection of lucerne by a root rotting fungus.

During the investigation of this disease at Coolum, most lucerne plants in an experimental planting of a quarter of an acre were affected by a general unthriftiness. The plants showed retarded growth, chlorosis and progressive defoliation. Examination of root systems showed that lateral rootlets, rhizobial nodules and parts of the tap roots often were rotted.

Isolations were made on three occasions during November and December, 1954. These revealed that the organisms consistently associated with the decay were an undetermined species of *Fusarium* and *Pythium myriotylum* Drechs. These two organisms were accordingly subjected to pathogenicity tests. For comparison, an isolate of *Rhizoctonia solani* Kühn obtained from an unhealthy lucerne plant at Moolboolaman was included.

A screening trial was conducted in the laboratory.

Sterilized glass tubes of 1 in. diameter, partly filled with a nutrient agar, were planted with lucerne seed that had been previously surface sterilized with mercuric chloride. Three to four weeks later, when the seedlings were about 2 in. high, inoculation was carried out by placing a small block of a 2-day-old potato-dextrose-agar culture of the test organism against the bottom of each stem. Sterile tap water was then added to replace moisture lost during the growth of the seedlings and the tubes were placed in diffuse light in the laboratory. After three to five days, plants were examined for signs of fungal attack.

Each of three isolates of *P. myriotylum* proved virulently pathogenic to lucerne seedlings under the conditions of the test. The stems and leaves of inoculated plants became shrivelled, wilted and curled.

In contrast, seedlings inoculated with *R. solani* had a black discoloration of the stem and withering of lower leaves, while those inoculated with *Fusarium* sp. showed only a slight stem rot. Control plants remained healthy.

A pathogenicity experiment was carried out in the glasshouse.

On Jan. 27, 1955, nine pots of steamed soil were planted with lucerne seed previously inoculated with an effective strain of *Rhizobium*. Three weeks later (Feb. 17), stands were thinned to about 20 plants per pot. Three pots were inoculated with *P. myriotylum* and three with *R. solani* by mixing small pieces of potato-dextrose-agar cultures with the surface soil. Steamed soil, sufficient to cover the inoculum, was added to all pots, which were then watered immediately. Subsequent watering was maintained to keep the plants growing normally.

Four days later, all plants in pots inoculated with *Pythium* were wilted and shrivelled and displayed an unhealthy light leaf colour. Examination showed that the roots and stems at ground level were severely affected by a soft rot, from which *P. myriotylum* was recovered. These symptoms were comparable with those shown by plants suffering from root rot in the field. The greater severity of symptom expression in the pot test could be expected because of the age and succulence of the plants and the fact that sterilized soil was used. In contrast to plants in *Pythium*-inoculated pots, those in uninoculated pots and pots inoculated with *R. solani* remained healthy (Fig. 1).

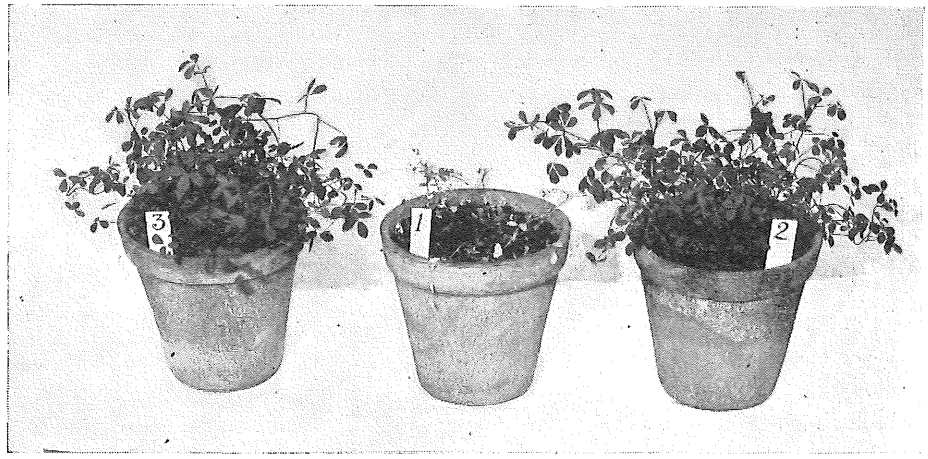

Fig. 1.
Symptoms Displayed by Lucerne Plants Inoculated 22 Days Previously with (1) *Pythium myriotylum* and (2) *Rhizoctonia solani*. Pot 3 is uninoculated.

From the above evidence, the causal relationship of *Pythium myriotylum* with the disease at Coolum appears well established. However, field observations suggest that cultural conditions are important in determining the severity of attack.

The original severe outbreak of the disease occurred early in the life of a patch of lucerne planted in 1954 on virgin soil containing a large amount of decomposing roots and other parts of the native plants. In this case, almost all plants were lost within four months of seeding.

In a second planting in 1955, in well-prepared soil of similar nature situated about half a mile from the earlier site, a few plants exhibited unthriftiness 12 months after planting. Examination of these showed that large roots had rotted back severely and some feeder rootlets were also affected. *P. myriotylum* was isolated consistently from both large roots and rootlets.

Weather conditions in the two years were not sufficiently different to account for the difference in disease incidence, and it is suggested that in the first planting the presence of decomposing organic matter encouraged a build-up of the soil population of *P. myriotylum* and also affected the nutrient status of the soil. The decline of isolated plants in the second planting was associated with waterlogging of the subsoil which had occurred since the establishment of the lucerne.

The most practicable way of reducing losses from root rot caused by *Pythium myriotylum* appears to be to correct unsatisfactory cultural conditions as far as possible.

D. S. TEAKLE, Science Branch.