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PEANUT DISEASES IN BARBADOS AND THEIR CONTROL

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INTRODUCTION

For many years diseases have been an important and often limiting factor in peanut production in the Caribbean. Nowell (1923) in his study of plant diseases in the Lesser Antilles referred to three destructive diseases, namely root and stem rot caused by Sclerotium rolfsii Sacc., rust caused by Puccinia arachidis Speg., and cercospora leaf-spot caused by Cercosporidium personatum (Berk. & Curt) Deighton. These two leaf diseases are still the most serious ones that occur in the Caribbean.

Peanut production in Barbados has expanded markedly in recent years, with some 200 acres being planted in 1971, using varieties bred in the U.S.A. (Florigiant and Tennessee Red.). To assist the commercial peanut growers, the Ministry of Agriculture has conducted various investigations, such as the mechanization of planting and chemical weed control. The present paper gives the results of a survey into the nature and incidence of peanut diseases, and of fungicide trials to control rust and cercospora leafspot.

MINOR DISEASES

Pythium root rot

The incidence of this disease is seldom high, but at times it may kill large numbers of seedlings and plants up to 8 weeks old, when these have already been weakened by minor element deficiencies. It appears that under such circumstances the residual activity of the standard Thiram based seed dressing is too short. The incidence of this and the following disease is greater when the seeds are sown too deep, and hence, this should be avoided.

Rhizoctonia root rot

Rhizoctonia solani Kuhn is a very common inhabitant of soils in Barbados, and may attack peanuts at all stages of development, although it seldom causes serious losses. Seedlings are usually attacked at or just below soil level, and a dry rot develops, which causes the shoots to wilt and die. Older plants are more resistant and infection is generally limited to areas where the runners are in contact with the soil. At these points small brown sunken necrotic spots may be formed.

Diaporthe phaseolorum

Diaporthe phaseolorum (Cooke & Ellis) Sacc., Myrothecium roridium Tode ex Fr., and a Phyllosticta sp. have been isolated from whitish or brownish sunken necrotic spots on runners. Pathogenicity tests conducted on greenhouse plants have indicated that all three fungi can produce necrotic spots when infection occurs through wounded tissues but only D. phaseolorum is able to infect healthy tissue. It seems likely that infection by these fungi commonly occurs through wounds caused by abrasive contact between the soil surface and the runners.

Southern Blight

Although Nowell (1923) found this disease caused by Sclerotium rolfsii to be a serious one, particularly during exceptionally wet periods, it has not been responsible for any extensive damage to peanuts in Barbados in recent times. However, it is potentially serious because it is widely distributed in Barbados, it has many hosts, and some commercial growers have to practice a short rotation. The most common symptom is a stem rot and wilt, and it can be readily distinguished from other fungi which cause similar damage, by the white cottony growth which commonly covers the affected stem at and just below soil level. This growth may contain whitish to dark brown cabbage seed-like bodies. The only control methods are deep ploughing of crop residues and long rotation.

Leafspot Diseases

Cercospora canescens Ell. & Mart. infrequently produces reddish brown spots on old leaves. More frequent is a small brown to dark brown spot caused by Phyllosticta arachidis hypogaeae Vasant Rao. When they are old, these spots have dark margins and pale centres.

Phyllostictina sp.

This has been found to form small dark brown to blackish leafspots, which may be numerous and hence produce symptoms similar to those caused by Leptosphaerulina trifolii (Rost.) Petr. The latter fungus also occurs in Barbados, but only low levels of infection have been observed.

Heavy but localized attacks of a leaf blight caused by Alternaria alternata (Fries) Keissler have been observed from time to time. Initially only the leaflet tips are affected but the brown to brown-black lesions may spread until almost half of the leaflet is killed.

Control measures against these minor leaf diseases are generally not economic, but most of them will be controlled by the fungicides used against cercospora leafspot (C. personatum).

MAJOR DISEASES

Crown Rot

This name is usually reserved for the disease caused by Aspergillus niger van Tieghem, although it is only when this fungus attacks older plants that a crown rot actually occurs. More often A. niger causes a post-emergence blight of seedlings, which is largely prevented by the use of Captan or Thiram seed-dressings, and by avoiding planting too deep. The crown rot condition appears initially as a brown depressed area on the stem just below ground level. Under favourable conditions the necrosis spreads rapidly and girdles the stem. The shoot then wilts rapidly, particularly during dry weather, and the plant dies. This form of crown rot normally can be readily distinguished from similar rots caused by other fungi, by the dark brown to black spore mass which covers the decayed area. In Barbados this crown rot is most commonly found on plants already weakened by micro-nutrient deficiency.

Diplodia Blight

This is caused by Botryodiplodia theobromae Pat (syn. Diplodia natalensis Pole-Evans) may be confused with crown rot, but with this disease the stem necrosis commonly extends well above ground level so that the main branches are also decayed. The infected areas tend to shred slightly and numerous small raised black fruiting bodies of this fungus can be seen embedded in the affected epidermal tissues. It attacks peanuts at all stages of development, but in Barbados it is most common during the second half of the growth cycle, and plants weakened by minor element deficiency are more susceptible. Severe attacks have resulted in 14% reduction in plant population. Although benomyl (Benlate) and thiobendazole (Tecto 40 Flowable) have been reported to have some activity against B. theobromae, they gave no significant control at rates equivalent to 18 g/ha and 250 ml/ha, respectively, applied at 14 day intervals.

Cercospora leafspot

In Barbados this is caused by Cercosporidium personatum (Mycosphaerella berkeleyi) although in other parts of the world, particularly Africa a related fungus Cercospora arachidicola is more important. The spots are dark brown to blackish, and do not have a conspicuous yellow zone around them. Heavy infection results in defoliation, and if this occurs early in the season, both the quantity and the quality of the nuts are reduced.

The disease is most serious in those seasons with higher than average rainfall. In our field trials it has been observed that late planted peanuts are less heavily attacked than early planted ones, the average number of lesions/leaflet being 0.47 and 3.31, respectively. The difference can be related to the lower amount of rain received by the late planted nuts. Similarly Cercospora has not been a problem on irrigated peanuts.

We have compared the present recommended fungicide Dithane M45, with Daconil 2787 Benlate and Tecto 40 flowable. The variety used was NC 17 and a straight line experimental layout positioned approximately at right angles to the prevailing wind was used to reduce movement of spores between plots. There were no untreated control plots in the experiment. Disease and defoliation was assessed on 20 main branches selected at random from each plot.

Benlate and Daconil applied at 14 day intervals from the onset of infection reduced the mean number of leafspots/leaflet, percentage defoliation and increased yields significantly more than Dithane M45 applied on a routine 7 day schedule. There was no significant difference between the high and low rates of Benlate, that is, 12 and 18 g/ha. Tecto

40 was not significantly better than Dithane M45. In a late planted, but otherwise identical trial to the above, the incidence of cercospora leafspot was much less, and there was no significant differences between any of the treatments.

Rust

This disease caused by Puccinea arachidis is widespread in the Caribbean, Central and South America (Bromfield, 1971). In the field it commonly attacks plants already infected by C. personatum and, therefore, it is difficult to determine the loss in yield due to rust alone. Nowell (1923) reported that it was more prevalent in the years with higher than average rainfall, but in Barbados it has caused severe damage to peanuts grown under irrigation in the dry season, although with rain-fed crops, late planted peanuts are usually less heavily infected than earlier planted ones.

P. arachidis produces typical small red-brown lesions, which are most obvious on the lower leaf surface. Heavily infected plants loose all their leaves and die. As with C. personatum if infection occurs late in the season, rust has little effect on yield, but early infection reduces the number and size of the kernels, with many of them failing to fill out.

Since it is not possible to predict the occurrence of rust, and, therefore, whether protective sprays are necessary, we have been comparing two systemic fungicides with eradicant properties, namely Plantvax and Hoe 2989 (pyracarbolid), with two protective type fungicides, Dithane M45 and Daconil 2787. The latter fungicides were applied on a routine schedule, whereas the systemic fungicides were applied when rust was first observed in the experimental plots. In an experiment with untreated control plots, Dithane M45 applied at 7 day intervals significantly decreased defoliation caused by rust. The other experiments have not included untreated control plots and only direct comparisons between the fungicides are made. In a trial with high levels of infection there were no marked differences between any of the treatments. However, in a late planted, less heavily infected trial, two applications of Plantvax or Hoe 2989 at 14 day intervals, gave appreciably better control than ten applications of Dithane at 7 day intervals, but yields were not significantly different. Control by Daconil on a 14 schedule was not significantly different from that of Dithane. Harrison (1971) also found no appreciable difference in rust control between Daconil and Dithane. The results suggest that correctly timed applications of Plantvax or Hoe 2989 may give satisfactory rust control. Further experiments are in progress.

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