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CONTROL OF RUST AND CERCOSPORA LEAFSPOT OF PEANUTS IN JAMAICA

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INTRODUCTION

There are three main diseases of the above-ground parts of the peanut (Arachis hypogea L.) in Jamaica. Cercospora personata (Berk. & Curt.) Ell. & Ev. and Cercospora arachidicola Hori are two species which cause leafspots and, in addition, there is rust which is caused by Puccinia arachidis, Speg.

C. personata forms black nearly circular spots on the leaves and produces conspicuous conidiophores and conidia in more or less concentric rings on the under surface of infected leaves. Because sporulation is rather prolific this fungus is likely to cause serious losses.

C. arachidicola forms dark brown lesions which, especially on the upper surface of the leaf, are surrounded by a yellow halo. Sporulation is much less abundant than in the case of C. personata.

Rust is characterized by the production of numerous rusty brown postules especially on the under surfaces of infected leaves. This disease is reputed to be the main limiting factor to commercial peanut production in the West Indies (6).

All three diseases can in severe cases cause leaf fall and premature death of the plant, giving rise to decreased yields. Fortunately, the diseases generally occur fairly late in the life of the plant, rarely before 5-6 weeks after planting, with the possible exception of C. arachidicola. Infection generally begins on the older leaves and progresses upwards. In addition, there is some measure of variation in varietal susceptibility to the Cercospora leafspots. The runner (hypogaea) types, which generally are later maturing, tend to be less susceptible than the bunch (fastigiata) types (6).

A number of recent reports have indicated effective control of Cercospora leafspots with benlate (1, 3, 5, 7, 8, 10, 11, 12, 14) and Daconil (3, 5, 10, 12).

Harrison (3) tested a number of fungicides for control of rust and Cercospora leafspots. He found that Bravo (Daconil 2787), Dithane M45, Fungi Sperse and KX3 reduced the severity of both diseases and resulted in increased yields. In his experiment, plantvax and duter decreased the severity of rust and benlate gave almost perfect control of Cercospora leafspots. Brestan, a close relative of duter, and another tin compound (Hoechst 2799) also have been reported to control peanut rust in Suriname (4, 9). Vidhyasekaran and Kothandaraman (15) found that duter also was effective in controlling Cercospora leafspot.

This is one of the series of experiments designed to develop effective and economic control measures for peanut rust and Cercospora leafspots in Jamaica.

MATERIALS AND METHODS

A local variety of the Valencia type, which is highly susceptible to all three diseases, was planted on November 8, 1971 on a Maverly loam soil at Mona, Jamaica. The experimental design was a 3 x 9 randomized block with the effective plot consisting of 3 x 15 ft. rows spaced 2 ft. apart. The experiment was subject to normal cultural operations for weed control, irrigation, etc. No fertilizers were applied. The plots were not inoculated so that diseases which developed were due to natural infection.

Four fortnightly sprays were applied with a knapsack sprayer at a rate equivalent to 100 gallons (U.S.) per acre, beginning four weeks after planting. The fungicides used were benlate (1-butylcarbamoyl)-2-benzimidazole carbamic acid, methyl ester, 50% WP), plantvax (2,3-dihydro-5-carboxanilide-6-methyl-1,4 oxathiin-4,4 dioxide 75% WP) duter (triphenyl tin hydroxide 50% WP) kocide 101 (cupric hydroxide 56% WP) and wettable sulphur (98% WP).

Based on the results of a preliminary trial, disease incidence was assessed on leaves number 6 through 10 on February 4, on five randomly selected stems from each plot. Each leaflet was individually assessed on a zero through 4 scale. The Disease Index (D.I.) was determined by a modification of McKinney's formula (2) which follows:

$$D.I. = \frac{\text{Sum of all ratings}}{\text{No. of units}} \times \frac{100}{\text{Maximum disease category}}$$

Plots were harveated 101 days after planting, sundried, weighed and sampled for the determination of moisture content.

RESULTS

The results of this experiment are summarised in Table 1. Treatments containing benlate were significantly superior to all others at the 1% level in controlling C. personata, whereas treatments containing either plantvax or duter were significantly superior to all others at the 1% level in controlling rust.

The following treatments were significantly different at the 5% level only:

Duter/plantvax and duter (C. personata), benlate and kocide, benlate/plantavax and kocide, and benlate/wettable sulphur and plantvax (rust).

With regard to yield, all treatments were significantly superior to the control and the treatment containing plantvax only, but there were no significant differences between other treatments. Yield increases ranged from 41 to 64% over the control plot.

Three other obaervations are noteworthy in this experiment:

(1) leafspot caused by C. arachidicola did not occur;
(2) duter was slightly phytotoxic at the rate used;
(3) there was a mild incidence of an unidentified foliar disease which was not controlled by any of the fungicides used.

DISCUSSION

It is clear that the fungicides used varied in their effectiveness in controlling Cercospora leafspot and rust. Benlate was most effective against Cercospora whereas plantvax and duter were most effective against rust. It appears that best control of both diseases could be obtained by a mixture of benlate and plantvax or benlate and duter. Arneson (3) already has made a similar suggestions regarding the benlate/plantvax mixture based on work in Honduras and Nicaragua, but suggested that short spray cycles - no more than 7 days between applications were necessary. It is interesting to note Thompson's (14) observation that three applications of benlate were as effective as seven applications in controlling Cercospora leafspot. Quite obviously, climatic factors play an important role in determining the frequency of spray application.

The yield data clearly indicate that Cercospora leafspot was a more important contributor to yield reduction than was a rust. However, it is equally clear that under the conditions of this experiment, the peanut plant was able to tolerate a reasonably high level of foliar diseases without a drastic reduction in yield. This presumably is attributable mainly to the time of first appearance and build up of the diseases, for although these diseases generally occur fairly late in the life of the crop, given a high inoculum level at en early stage and an environment conducise to disease development it is likely that a very different set of results will emerge. In fact, in one of our own experiments with peanut rust, plants that were inoculated 14 days after planting developed severe symptoms of rust infection within 10 days.

Work in this area is being continued and it is expected that realistic recommendations for control of these diseases will be made shortly.

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TABLE 1

Disease index and yield of peanuts treated with various fungicides

TREATMENT (Rate lb./acre active ingredient)	DISEASE INDEX ** Cercospora personata	Rust	YIELD** (lb./acre***)
Benlate (0.25)	0.88 a	36.87 cde	2580 a
Benlate (0.25) + Wettable surphur (12.0)	1.33 a	34.21 bcd	2725 a
Benlate (0.25) + Plantvax (1.0)	2.61 a	11.87 a	2872 a
Duter (0.25) + Plantvax (1.0)	25.25 b	0.87 a	2507 a
Duter (0.25)	44.23 c	9.81 a	2560 a
Kocide 101 (3.0)*	55.40 c	25.63 bc	2347 a
Kocide 101 (3.0)* + Plantvax (1.0)	57.08 c	5.43 a	2464 a
Control	80.14 d	45.83 de	1655 b
Plantvax (1.0)	87.15 d	3.74 a	1563 b
C.V.	23.1%	30.1%	10.04%

*Rate expressed in lb/acre of product
** Treatments not followed by the same letter are significantly different by Duncan's Multiple Range Test at 1% level except otherwise stated
*** 88% dry matter unshelled peanuts