Research Note

SUITABILITY OF CHLOROTHALONIL IN THE MANAGEMENT OF FOLIAR DISEASES OF PIGEON PEA[1]

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Pigeon pea (*Cajanus cajan* L. Millsp.) is a popular grain legume in Puerto Rico and other countries in the Caribbean. The importance of pigeon pea lies not only in its high nutritional value but also in its ability to produce on marginal lands not well suited for other crops. Rust (*Uredo cajani* Syd.) is a common disease in pigeon pea fields but severity of infection and yield loss varies among years.

Resistance has been the main tool for the management of rust and other foliar diseases of pigeon pea (Rodríguez and Meléndez, 1984a). Fungicides have also proved effective in reducing levels of rust in pigeon pea (Rodríguez and Meléndez, 1984b). In this trial the effectiveness of chlorothalonil to control rust in pigeon pea was assessed in a field experiment at the Isabela Agricultural Experiment Substation to provide data for product registration. The fungicide was sprayed on a weekly basis to the foliage of cultivar 2B Bushy at 2.5, 5.0 and 10 L/ha. Applications were initiated immediately after the appearance of first rust symptoms with a pre-harvest interval (PHI) of 14 days. Fungicide treatments and a control were replicated four times and arranged in a randomized complete block design. The experiment covered an area of 0.03 ha with experimental units of 8 m^2. Each unit had three rows of 15 plants spaced at 0.9 m. The sampling units consisted of the inner ten plants from the central row. To insure disease pressure the experimental site was located near an old pigeon pea plantation with high inoculum potential. Spreader rows of the rust-susceptible cultivar 98 were planted as borders one month prior to establishing the experiment.

Rust incidence, severity and defoliation were used as criteria for evaluation. To determine incidence, five leaves were collected at random at intervals of approximately 20 cm along the main axis of each plant in the experimental plot. Incidence was determined on the basis of number of rusted leaves/number of asymptomatic leaves. To evaluate the severity of rust, a pictorial scale based on the density of pustules was developed by placing leaves on paper of 1-mm squares with each small square representing a pustule (Figure 1). With this method the percentage of rusted area was estimated as 0= no rust; 1 = 1 to 20%; 2 = 21 to 40%; 3 = 41 to 60%; 4 = 61 to 80%; 5 = 81 to 100%. An average score of three leaflets was the rating of the leaf. Plants of the sampling unit were visually rated for percentage of defoliation on a 0 to 5 scale in which 0= abundant foliage with no apparent abnormal leaf shedding; 1 = 1 to 20%; 2 = 21 to 40%; 3 = 41 to 60%; 4 = 61 to 80%; 5= 81 to 100% of defoliation. Indexes for severity and defoliation were calculated by following Sherwood and Hagedorn (1958).

During the experiment, other phytosanitary problems occurred. A premature bud and flower drop (BFD) leaving scars on the branches was observed. Considering the po-

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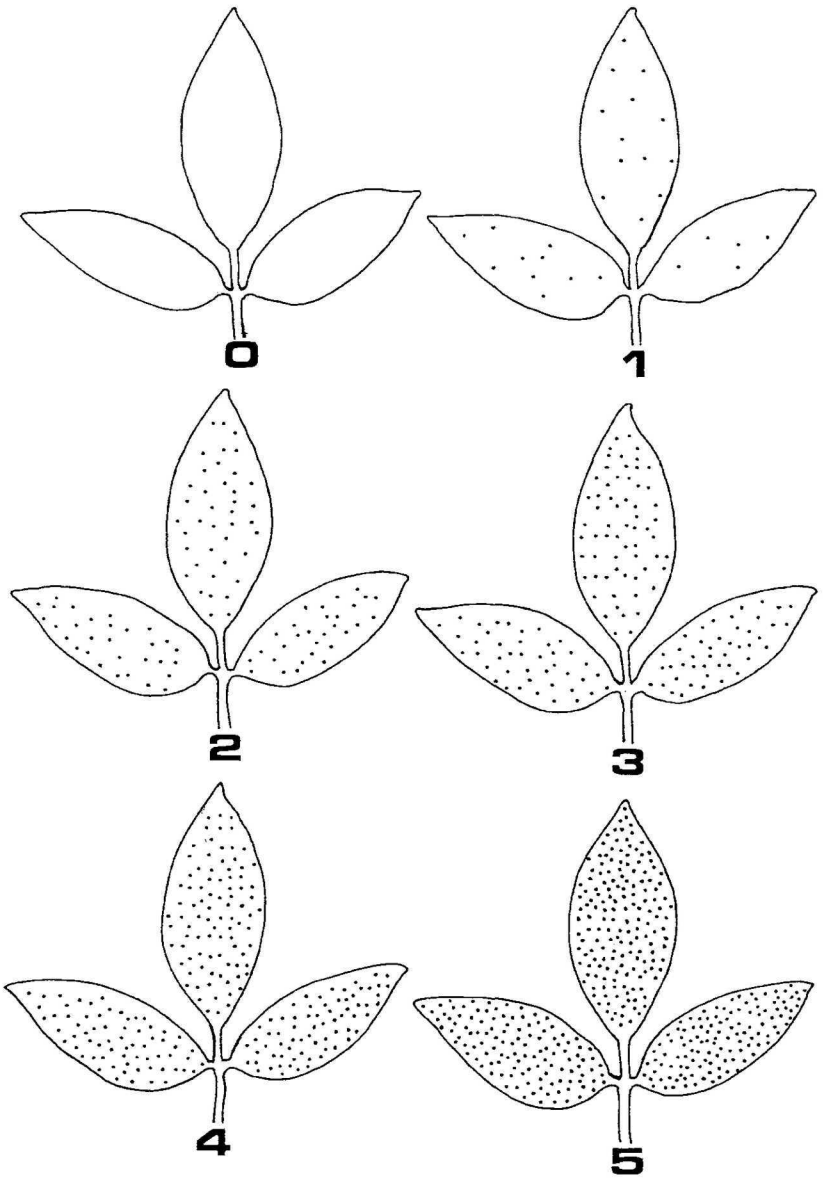

FIGURE 1. Pictorial scale to estimate rust severity based on the percentage of leaf area rusted. 0 = no rust; 1 = 1 to 20%; 2 = 21 to 40%; 3 = 41 to 60%; 4 = 61 to 80%; 5 = 81 to 100%.

tential of a pathogen role, scars were counted on three branches of five plants randomly selected from the experimental row, and the incidence was determined. Because pod anthracnose caused by *Colletotrichum* sp. was common at harvest, a sample of 100 pods was assessed for anthracnose incidence.

The effects of treatments in all variables were examined by using the analysis of variance and the means compared with Duncan's Multiple Range Test with a $P \leq 0.05$. The relationship between production (unshelled green pods) and disease parameters was tested by using correlations.

Chlorothalonil was significantly effective in reducing incidence of rust, anthracnose, BFD and defoliation (Table 1). Increased dosage of the fungicide reduced the incidence and severity of rust, and incidence of pod anthracnose, but not of BFD and defoliation. Production was significantly increased with fungicide treatments. All variables tested were negatively correlated with production but the relationship was stronger with defoliation (Table 2). Rust severity and anthracnose incidence were strongly associated with defoliation of plants. Level 3 in the severity scale (Figure 1) was the highest obtained; after that, defoliation of the infected leaves occurred.

Pigeon pea is generally considered a sturdy crop that can successfully withstand the impact of diseases. The importance of rust in pigeon pea has been acknowledged and efforts to identify sources of resistance continued (Echávez-Badel and Bosques-Vega, 1998). Anthracnose in pigeon pea was first reported in Puerto Rico in 1927 (Tucker, 1927)

TABLE 1. *Effect of chlorothalonil dosage on rust incidence (I) and severity (S), incidence of pod anthracnose, bud and flower drop (BFD) and overall defoliation of field grown pigeon pea.*

Dosage (L/ha)	Rust		Anthracnose	BFD	Defoliation	Production
	I	S	I	I	I	(kg/plot)
0.0	0.97 a[1]	0.80 a	0.88 a	0.91 a	0.85 a	0.70 a
2.5	0.68 b	0.51 b	0.15 b	0.81 b	0.35 b	1.75 b
5.0	0.36 c	0.23 b	0.11 bc	0.82 b	0.25 b	2.10 b
10.0	0.17 d	0.06 c	0.08 c	0.79 b	0.20 b	1.75 b

[1]Means in a column followed by the same letter do not differ significantly at $P \leq 0.05$ with Duncan's Multiple Range Test.

TABLE 2. *Correlations between production (unshelled pods) and, incidence and severity of rust, incidence of anthracnose, BFD (bud flower drop) and defoliation of field grown pigeon pea.*

	Rust		Anthracnose	BFD	Defoliation
	Incidence	Severity			
Production	-0.63*	-0.74*	-0.72*	-0.72*	-0.77*
Rust Incidence		0.90*	0.85*	0.69*	0.87*
Rust Severity			0.96*	0.82*	0.94*
Anthracnose				0.78*	0.90*
BFD					0.86*

*Coefficients significant at $P = 0.01$.

and has not been considered a limiting disease for pigeon pea in Puerto Rico. However, in recent years this disease had been observed with greater frequency in pigeon pea plantings on the northern coast (Echávez-Badel and Alameda, 1998). Bud and flower drop was first detected in this trial, and studies to define the etiology yielded *Alternaria* sp. as the probable cause of the disease (Hepperly and Rodríguez, 1986). As is common with most pigeon pea diseases, the epidemics are sporadic; therefore, their importance is underestimated. Results from this trial demonstrated that diseases can have a significant negative impact on pigeon pea production. In the absence of resistant cultivars, the use of fungicides is a viable alternative in the management of these pigeon pea diseases.

LITERATURE CITED

Echávez-Badel, R. and A. Bosques-Vega, 1998. Reaction of new long-day pigeonpea genotypes to rust (*Uredo cajani*). *J. Agric. Univ. P.R.* 82:201-208.

Echávez-Badel, R. and M. Alameda, 1998. Incidence of anthracnose in long-day pigeonpea trials. *J. Agric. Univ. P. R.* 82:209-211.

Hepperly, P. R. and R. Rodríguez, 1986. A new blight of pigeon pea in Puerto Rico. *J. Agric. Univ. P. R.* 70:79-83.

Rodríguez, R. and P. L. Meléndez, 1984a. Field screening of pigeon pea (*Cajanus cajan*) for resistance to foliar diseases in Puerto Rico. *J. Agric. Univ. P.R.* 68:275-279.

Rodríguez, R. and P. L. Meléndez, 1984b. Evaluation of fungicides for the control of foliar diseases on pigeon peas. *Fungicide and Nematicide Tests* 39:71.

Tucker, C. M., 1927. Pigeon pea anthracnose. *J. Agric. Res.* 34:589-596.

Sherwood, R. T. and D. J. Hagedorn, 1958. Determining common root rot potential of pea fields. Agric. Exp. Stn. Univ. Wis. Bull. 531.