

The status of three common leaf disease of Para rubber in Nigeria

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1 SUMMARY.

The status of three common leaf diseases of *Hevea brasiliensis* Muell. Arg. (Bird's eye spot, *Colletotrichum* leaf fall and *Corynespora* leaf fall) was studied in six local clones (NIG 800, 801, 802, 803, 804, and 805) and three exotic clones (PR107, RRIM 707 and GT1). The study was carried out in a 40ha clonal garden at the Rubber Research Institute of Nigeria (RRIN), in a randomized complete block design. Each clone was replicated four times with 462 trees per experimental unit. The plant spacing was 3.34m X 6.7m. Incidence of *Corynespora* leaf fall disease was highest with disease index ranging from 26.19 – 40.19, while *Colletotrichum* leaf fall incidence was least (7.61 – 17.91). RRIM 707 clone had the highest disease indices for *Corynespora* leaf fall and Bird's eye spot infection, while NIG 803 clone was most affected by *Colletotrichum* leaf fall disease. This study suggests adequate control of the leaf diseases is necessary to forestall an epiphytotic situation where latex yield could be adversely affected.

2 INTRODUCTION

Hevea brasiliensis (Muell. Arg.), commonly called Para rubber, is affected by a plethora of diseases caused by pathogens and parasites as well as by others of non-pathogenic origin. Infection of the rubber tree by foliar pathogens causes devastating effects especially in the nursery but also on the immature and mature trees (Awoderu, 1969; Rao, 1975; Begho, 1995; Jayasinghe *et al.*, 1995; Jayasinghe, 2000). Harinidi *et al.*, (1996) reported that prolong infection of susceptible clones by *Corynespora cassiicola* could cause the crown becomes defoliated for the whole year. Folial infection in

immature trees could cause dieback, stunting or death of trees, while in mature trees it reduces latex production to less than 45%. The three common leaf pathogens of rubber of immense economic importance in Nigeria are Bird's eyespot (*Drechslera beveae*), *Colletotrichum* leaf fall (*Colletotrichum gloeosporioides*) and *Corynespora* leaf fall (*Corynespora cassiicola*). This study evaluated the occurrence of these three leaf diseases in nine rubber clones in a 40ha clonal garden at Rubber Research Institute of Nigeria, main station, Iyanomo, Benin City.

3 MATERIALS AND METHODS

A field survey was conducted in the clonal garden of RRIN. Experimental plots in this garden were planted in 1991 and opened for tapping in 1998. This study was conducted in 2008 and 2009 in the months of June / July respectively on nine rubber

clones (NIG 800, 801, 802, 803, 804, 805, PR 107, RRIM 707 and GT1) in a randomized complete block design (Table 1). Each clone was replicated four times with 21 X 22 trees per experimental unit at a planting spacing of 3.34m X 6.7m.

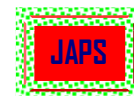


Table 1: Layout of the experimental plot

21	NIG 800	PR 107	RRIM 707	NIG 805
21	NIG 805	NIG 802	NIG 803	GT 1
21	NIG 801	RRIM 707	NIG 804	NIG 802
21	PR 107	NIG 805	NIG 800	NIG 803
21	GT 1	NIG 800	NIG 801	NIG 804
21	NIG 803	GT 1	PR 107	RRIM 707
21	NIG 802	NIG 804	GT 1	NIG 801
21	RRIM 707	NIG 803	NIG 802	NIG 800
21	NIG 804	NIG 801	NIG 805	PR 107
21	22	22	22	22
	I	II	III	IV
REPLICATES				

Four quadrants of 1m x 1m per each experimental unit were mapped out for the survey. The quadrants were cleared and left for three days to allow sufficient falling leaflets to gather in it. Twenty leaflets were picked at random from each quadrant for disease assessment. The leaflets were assessed

for incidence of leaf infection based on disease severity. The disease score –rating chart (IRRDB, 2000; Ogbekor & Adekunle, 2005), did assessments of infection (Table 2) from which disease Manju et al., (2001), calculated index (D.I) according to Parry (1990) with slight modification.

Table 2: Disease score chart

Infection categories	Rating
No Infection spot	0
Less than 10% of leaves infected (Very light) up to 5 spot	1
Light – 5 to 10 spots and 10-25% leaves fall	2
Moderate > 10 spots and 26 to 50% leaf fall	3
Severe – Large lesions and 51 to 75% leaf fall	4
Very Severe – Large lesions and > 75% leaf fall	5

$$\text{Disease Index (D. I.)} = \frac{(0 * a) + (1 * b) + (2 * c) + (3 * d) + (4 * e) + (5 * f)}{a + b + c + d + e + f} \times \frac{100}{X}$$

Where:-

0, 1, 2, 3, 4, 5 = Infection categories

a, b, c, d, e, f = No of leaves/ plant that falls into the infection categories

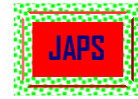
X = Maximum No of infection categories.

All data were subjected to analysis of variance and treatment means separated by the use of the least significant difference.

4 RESULTS AND DISCUSION

Results (Table 3) showed that *Colletotrichum* Leaf fall had the highest DI in NIG 803 clone (17.91), followed by PR 107 clone with 14.33. The least DI was in GT 1 clone (7.61). The DI for NIG 801 to NIG 805, PR 107 and RRIM 707 clones were not significantly different ($p \geq 0.05$). The DI for GT 1 and NIG 803 clones differed significantly ($p < 0.05$).

For *Corynespora* leaf, fall disease results showed that RRIM 707 clone had the highest DI (40.19); while the least DI was recorded in NIG 802 clone (26.19). The DI recorded in NIG 801, 803,804 and 805; GT 1; PR 107 and RRIM 707 clones were not significantly different ($p \geq 0.05$) but were significantly different from NIG 800 and 802 clones ($p < 0.05$).



Bird's eye spot infection in RRIM 707 clone was highest with DI of 32.02 while PR 107 clone had the lowest DI (14.62). The DI in both RRIM 707 and PR 107 differed significantly ($p < 0.05$).

Of the three diseases studied, *Colletotrichum* leaf disease had the lowest DI, which ranged from 7.61 to 17.91; while *Corynespora* leaf fall disease had the

highest DI (26.19 to 40.19). Analysis of variance run on all pair wise comparisons showed that pathogens were highly significant ($p < 0.05$). Pair wise comparisons on means on clonal basis were not significant ($p \geq 0.05$); where as there were significant difference when means of pathogens were compared.

Table 3: Disease index (D.I) of three common leaf diseases of rubber at the Rubber Research Institute of Nigeria clonal garden

Clones		D.I of leaf diseases (%)		
		<i>Colletotrichum</i> leaf fall	<i>Corynespora</i> leaf fall	Bird's eye spot
RRIN-developed:				
NIG	800	29.86 ^x (6.83)	29.47 (17.06)	18.64 (15.93)
	801	12.04 (9.09)	30.50 (16.59)	29.50 (24.72)
	802	10.24 (3.48)	26.19 (14.32)	17.04 (12.74)
	803	17.91 (1.98)	32.07 (17.71)	16.57 (12.29)
	804	10.22 (6.82)	36.22 (15.41)	25.72 (18.21)
	805	12.55 (8.15)	38.46 (22.00)	30.22 (19.93)
Exotic:				
	GT 1	7.61 (4.75)	31.81 (15.84)	15.33 (19.44)
	PR 107	14.33 (8.61)	32.49 (18.45)	14.62 (18.45)
	RRIM 707	10.00 (6.93)	40.19 (24.52)	32.02 (19.54)
	LSD	5.91	10.19	14.55
	CV%	44.1	50.4	67.0

^x is means of twelve DI;

Data in parenthesis are standard deviation

The result of *Corynespora* leaf fall disease is alarming being higher than *Colletotrichum* leaf disease and Bird's eye spot disease. According to Awoderu (1969) *Corynespora* leaf fall disease was then regarded as a new leaf spot disease in Nigeria. Chee (1990) demonstrated that RRIM 600 and GT 1 clones are moderately susceptible to *Corynespora* leaf fall disease. However, findings in this study showed that GT 1 clone is as susceptible to *Corynespora* leaf fall disease as RRIM 707 clone, which recorded the highest DI. This result demonstrates that the resistance of GT 1 to *Corynespora* leaf fall disease may have been lost over time, probably due to presence of more virulent races of the pathogen.

According to Rao (1975) *Colletotrichum* leaf disease and Bird's eye spot disease are regarded as nursery diseases but were reported in varying degrees (DI of 5.91-29.86 for *Colletotrichum* leaf fall, DI of 10.19-40.19 for *Corynespora* leaf fall and DI of

14.55-32.02 for Bird's eye spot) in plantations in this study. This result is relatively high especially for *Corynespora* leaf fall and Bird's eye spot incidence. These increasing disease indices are attributed to the low management of these leaf diseases from the nurseries and in the plantations. Awoderu (1969) also regarded *Corynespora* leaf fall disease as a nursery disease being observed mostly on seedlings from 8 -12 months-old. The study showed that leaf diseases are on the increase in plantations in Nigeria. The results suggest adequate control of the leaf diseases starting with treatment from the nursery to the plantations with appropriate fungicides to forestall an epiphytotic situation where latex yield could be adversely affected.

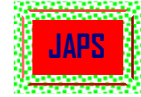
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