

# Seedling Blight Disease of *Raphia hookeri* Caused by *Glomerella cingulata* in Nigeria

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## ABSTRACT

A seedling disease of *Raphia hookeri* known as seedling blight is described for the first time. Among the associated organisms are *Curvularia eragrostidis* Henn. (*C. maculans*), *Drechslera halodes* Subr. & Jain, *Glomerella cingulata* (Stonem) Spauld & Shrenk, and *Pestolotiopsis* sp. *Glomerella cingulata* has been implicated as the causal organism of the disease. Survey of the disease showed occurrence in *Raphia* groves of six states of Nigeria.

*Raphia hookeri* Mann. and Wendl. is among the eight species in the genus *Raphia* which are indigenous to Nigeria (Otedoh 1982). Economic uses of *Raphia* include making of Piassava ropes, palm wine and alcohol and the fiber from the trunk and leaves have been recommended for paper production (Tuley 1965; Otedoh 1975; Odeyemi 1984, 1985). *Raphia* palm wine, now bottled for commercial purpose at Nigerian Institute for Oil Palm Research (NIFOR), has become a very popular drink in the country.

In spite of these many uses of *Raphia*, there is no report of any disease of the crop in literature. Available information on fungi associated with *Raphia* palm is that of Bailey (1966) who reported that species of *Sphaerulina* and *Hysterostomella* have been isolated from leaves of *R. sudanica* and *R. vinifera* respectively.

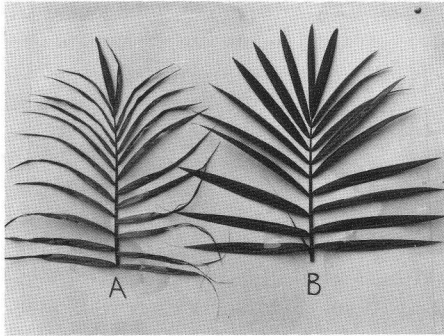
Following observation of seedlings infected in the nursery having a blighted

appearance in the Nigerian Institute for Oil Palm Research, near Benin City (Anon. 1981) this investigation was undertaken to determine the cause of the leaf disease and its spread among sprouted seedlings in the groves of six states of Nigeria. In the groves ripe fruits that drop from ripe infructescences germinate to form numerous seedlings from which cyclical replacement of old stands takes place.

## Materials and Methods

Leaves of seedlings of *Raphia* in the nursery were examined visually for symptoms of spots resulting in death of tissues or blighted appearance.

*Isolation of Fungi Associated with Blight:* Infected leaves were removed with sterile scissors from seedlings, and taken to the laboratory in sterile polyethylene bags. Leaflets were washed in running tap water and cut into pieces 5 mm in length. The pieces were surface sterilized with 0.1% mercuric chloride solution for 1 minute and rinsed with three changes of sterile distilled water, dried with sterile tissue paper, and plated on potato dextrose agar (PDA). Plates were incubated for seven days. Pure culture of fungi growing from the pieces were sub-cultured on fresh PDA. All pure cultures of fungi were maintained on PDA slopes in MacCartney bottles at 5° C in the dark.



1. (A) *Raphia* seedling, frond infected by blight. (B) *Raphia* seedling, frond healthy.

**Identification of Fungi:** Pure culture of fungi isolated from infected leaves was identified using Barnett and Hunter (1972) and C.M.I. description of pathogenic fungi and bacteria. Identifications were confirmed by the Commonwealth Mycological Institute, Kew, London.

**Pathogenicity Test:** Spore suspension of each isolate was prepared according to the method of Susuri et al. (1982) from three week old culture on PDA plates. Tween 80 was added to each lot of spore suspension at the rate of 1 ml/liter for easy spread of spores on leaves. Spore suspension of each isolate with spore load  $5.0 \times 10^5$  was sprayed to wetness on the upper and lower surfaces of leaflets of 2 month old seedling of *R. hookeri* with a hand sprayer (Gallenkamp W-BS-520-J) which produces a powerful intermittent or continuous jet of fine spray. The surfaces of leaflets were cleaned with cotton wool soaked in methylated spirit and rinsed with sterile distilled water and allowed to dry before spraying. Plants sprayed with sterile distilled water served as control. Fifteen seedlings of *R. hookeri* were sprayed for each isolate. The sprayed plants were enclosed in moistened polyethylene bags with water soaked paper towels placed at their bases for 48 hours to maintain high humidity. These plants were observed for three weeks for disease development in the greenhouse. The experiment was repeated twice. Where there was disease develop-



2. (A) Seedling of *Raphia* infected by blight. (B) Seedling of *Raphia* healthy.

ment, isolation was carried out, and isolates were compared with original isolates used in inoculation in terms of symptoms, conidia type and growth habit in PDA.

**Survey for Incidence of Seedling Blight:** Survey for incidence of seedling blight was carried out in 1984 in NIFOR Mainstation and *Raphia* groves in two locations in six states of Nigeria within the growing belt. Seedlings were randomly examined in all locations. Percentage infection was determined using the formula:

% Infection

$$= \frac{\text{No. of infected seedlings}}{\text{Total no. of seedlings examined}} \times \frac{100}{1}$$

## Results

**Symptomatology:** The symptoms begin with the youngest fully expanded leaves as a water soaked or oily transparent yellow

Table I. Incidence of seedling blight of *Raphia* in survey.

Location	Sample Size	No. of Seedlings Infected	% Infection	% Death
Bendel State				
NIFOR	600	106	63.60	2.67
Warri	300	76	25.33	7.00
Mosogar	200	85	42.50	12.00
Imo State				
Owerri	300	119	39.67	16.3
Umuahia	500	108	21.60	6.20
River State				
Elele	256	89	34.77	5.86
PortHarcourt	368	90	24.46	8.15
Cross River State				
Akamkpa	461	102	22.13	4.79
Oban	259	97	37.45	7.34
Akwa-Ibom State				
Abak	260	89	34.23	5.77
Ikotekpene	300	95	31.67	12.00
Anambra State				
Onitsha	362	99	27.35	8.00
Awka	260	76	29.23	5.38

circular spot about 1.0 mm in diameter, appearing on both surfaces of leaflets. They are found more on the tips, edges and middle region of leaflets. These circular spots become necrotic, surrounded by yellow haloes, giving an entire spot size of about 2–5 mm in diameter. Such numerous spots coalesce within two weeks from the onset of infection. The coalesced spots form a shade of chlorotic lamina with occasional occurrence of acervuli of *Pestotriopsis*. The infection spreads from tip to the base of leaflet (Fig. 1). At an advanced stage of the disease the lamina of the leaflets become fragile and gradually fall off, leaving a tattered leaflet and the entire seedling blighted (Fig. 2). In heavy attack complete death of seedling may occur, or surviving seedling may exhibit thrifty growth.

*Associated Organisms:* Isolation made from infected leaves revealed the fungus *Collectotrichum* state of *Glomerella cingulata* with C.M.I. number 283846. Other

fungi isolated are *Curvularia eragrotidis* with C.M.I. number 282583 and *Drechslera halodes* with C.M.I. number 261639. *Pestotriopsis* sp. was also occasionally isolated. *Glomerella cingulata* is pinkish white in PDA medium, producing unicellular conidia enclosed in pinkish orange acervuli. The conidia measured 12.5–15.0  $\mu$  long and 3.75–5.25  $\mu$  wide.

*Pathogenicity Tests:* There was development of typical oily water soaked spots on leaflets of plants inoculated with *Glomerella cingulata*. These developed into typical blight symptoms within three weeks of inoculation. The organism was re-isolated from inoculated plants and produced symptoms on reinoculated plants. Inoculation with *Curvularia eragrotidis*, *Drechslera halodes* and *Pestotriopsis* sp. did not produce blight symptoms nor did control plants show any symptom.

*Survey for Incidence of Blight:* The result of incidence of blight in six states of Nigeria and NIFOR is presented in Table 1.

## Discussion

The symptoms of *Raphia* seedling blight described in this study are similar to those of the oil palm described by Johnston (1959) in W. Malaysia and Watanavanich (1981) in Thailand, and partially similar to leaf anthracnose type 'C' of oil palm described by Bull (1954) and Robertson (1956). In all cases, the disease starts with the youngest fully expanded leaves. *Curvularia eragrostidis* was found to be the causal organism of oil palm seedling blight in Malaysia, Sabah and Thailand. But in this study this organism only occurred as associated organism in seedling blight of *Raphia*. *Glomerella cingulata* has been reported as the causal organism of anthracnose type 'C' in oil palm in Nigeria (Bull 1954) and leaf blight of onion in northern Nigeria (Ebenebe 1981). In this study apart from being frequent in isolation *G. cingulata* was shown to be the causal organism of seedling blight of *Raphia*. The occasional presence of acervuli of *Pestotiopsis* in infected chlorotic leaf area in the nursery makes seedling blight of *Raphia* differ from that of oil palm. The result of the survey for incidence of seedling blight indicates that the disease is found among seedlings in *Raphia* groves of all states visited. The highest percentage of infection was recorded in NIFOR with low death. The application of fertilizer and proper agronomic care of seedlings in the nursery may also precipitate seedlings vulnerable to attack by the disease when compared to those in the groves. This however requires investigation.

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