

Plant Disease Assessments and Naivety of a *Telfairia occidentalis* Hook Leaf Disease Index

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Abstract: Several disease assessments are available but most of these are more qualitative than quantitative. These qualitative disease indices are derived from arbitrary ratings ranging from zero to a number depending of the rating. Some of the ratings are subjective and depend on the prejudice of the researcher. The present disease index ($DI = 1.36 + 0.04W$) is not only reliable simple but also quantitative and does not introduce bias in disease assessment. It is therefore recommended for leaf disease assessment.

Key words: Assessment, diseases, index, severity, *Telfairia occidentalis*, leaf

INTRODUCTION

The incidence and severity of diseases have been studied by several workers and methods of disease assessments described. Among these assessments include the of Maduewesi (1977) in which the severity of the leaf spots of *Telfairia occidentalis* was assessed as a scale ranging from zero to 5 in which zero represented “no disease” while 5 represented “very severe” leaf spot, the Rot Indices of Arinze (1986) in which tomato rot was assessed as a rating ranging from zero (no rot) to 5 (total degradation of organ; Kassim (1986) in which rot was converted to a percentage severity through weight measurements. Gauhl *et al.* (1993) also assessed the Black Sigatoka disease of plantains through Disease Development Time (DDT), the time between storage b and the appearance of necrotic spots with dry centers while, Nwauzoma and Shuaibu (2009) estimated Black Sigatoka disease as the number of days between growth stage b and leaf death either due to normal senescence or complete infection. Below are the ratings of three assessment methods used as models.

Maduewesi (1977) described the following ratings for leaf spots of *Telfairia occidentalis*.

- 0 – No disease
- 1 – Trace
- 2 – Mild
- 3 – Moderate
- 4 – Severe
- 5 – Very severe

Arinze (1986) on the other hand, described the rot of tomatoes using the following disease ratings:

0 cm	-	not rot
0 – 0.5 cm	-	1
0.05 – 1.0 cm	-	2
1.0 – 1.5 cm	-	3
1.5 – 2.0 cm	-	4
Above 2.0 cm	-	5

Kassim (1986) measured the weight of relatively healthy organs and removed the infected portions and re-weighted. Percentage severity was described as follows:

$$\text{Severity (\%)} = \frac{W}{W} - w \times 100$$

Where;

W = Initial weight

W = Weight of rotted portion

The present leaf disease assessment method will be compared with the above three methods. This work is aimed at comparing the different methods of disease assessment as to grade their reliability.

MATERIALS AND METHODS

Ten *Telfairia* leaves infected with leaf spot disease were selected at the teaching and research farm of the Rivers State University of Science and Technology (RSUST), Port Harcourt, Nigeria in May, 2008. The present study was conducted at the Crop Science Laboratory of the University (RSUST). Using the method of Maduewesi (1977), the leaves were assessed visually and rated. The same leaves were assessed by the method of Arinze (1986) by measuring the diameter of spots using

Table 1: Comparison of some methods of disease assessments

No. of samples	Maduewesi (1977) (Severity index)	Arinze (1986) (Rot index)	Kassim (1986) (%)	Proposed (mm ²)
1	3	1	2.8	1.0
2	4	2	3.5	1.5
3	2	1	2.9	1.8
4	3	2	3.0	2.0
5	3	3	3.3	1.8
6	4	1	2.0	1.2
7	4	3	2.8	1.6
8	3	2	2.5	1.0
9	2	2	3.0	2.1
10	1	2	2.7	1.8
Σ55	29	19	28.5	15.8
\bar{X} 5.5	2.9	1.9	2.9	1.6
Regression equation	$Y=13.22 + 1.2 \bar{X}$	$Y=1.41 + 0.09 \bar{X}$	$Y=3.16 - 0.48 \bar{X}$	$Y=1.36 + 0.42 \bar{X}$

a metre rule and taking the mean of readings for all spots. In another method described by Kassim (1986), the fresh weight of the leaves was taken and the spots were cut-off from the leaves and re-weighed. The differences between the initial and final fresh weights were taken as a percentage of the initial weight. In this work, the leaves were traced on a plane white drawing sheet whose area (length x breadth) was weighted and recorded. The traced leaves were cut off according to the shape of the *Telfairia* leaves and weighed. The weight of the cut sheet was recorded and extrapolated with the weight of the sheet with known dimension. The spots were cut off from the traced paper as to determine the area of the leaves infected and weighed. The mean weight of whole leaves weight of the leaves after removing affected parts. The relationship among the methods was assessed by Regression as described by Kinako (1988).

RESULTS AND DISCUSSION

The results of the comparison of some methods of disease assessments are shown in Table 1. The results compared the disease assessment of Maduewesi (1977), Arinze (1986), Kassim (1986) and the proposed. The results indicate that the proposed disease index had the most perfect “line of best fit” (regression line) followed by Arinze (1986), Kassim (1986) and least in Maduewesi (1977). The proposed disease assessment was derived from the weight of the infected leaf parts vis-à-vis the weight of the entire leaf. Even though the disease index of Kassim (1986) was also derived as a percentage of the weight of infected parts of the fruits and tuber, the regression line was no as perfect as that of the proposed diseased index of *Telfairia* leaves. This research appears to indicate that the proposed disease index was better than Kassim (1986) disease index when leaves were considered. Though Arinze (1986) was based on a Hedonic scale of assessing rot of tomato fruits using lateral growth measurement, it was better than that of Kassim (1986), which used percentage of weight loss and result of infection. However, Maduewesi (1977)

assessment of leaf infection of *Telfairia* using an arbitrary scale appeared too qualitative than quantitative. Its use could therefore be based on the researcher’s prejudice. The proposed disease index of *Telfairia* leaves appeared not only reliable and quantitative but also promising. The proposed disease index of *Telfairia* leaves is therefore $1.36 + 0.04W$ where W is the weight of the infected leaf parts. While Kassim (1986) and Arinze (1986) appeared better for fruits and tubers, Maduewesi (1986) and the proposed disease index appeared better for diseased leaf assessment. However, the proposed disease index appeared more promising than that of Maduewesi (1977).

CONCLUSION

This work indicates that the proposed disease index (DI= $1.36 + 0.04W$) had the most perfect “line of best fit” followed by the indices proposed by Arinze (1986), Kassim (1986) and least in Maduewesi (1977). This research showed that the proposed disease index for assessing *Telfairia* leaf diseases was not only reliable and quantitative but also sensitive to changes in infection.

ACKNOWLEDGMENT

The author acknowledges the efforts of Abiola Mutiatu Bello and Dr. (Mrs.) Edith C. Chukwu in the course of this work and to the laboratory staff of the Department of Crop and Soil Science and Forestry, Rivers State University of Science and Technology, Port Harcourt, Nigeria.

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