

Influence of inter-cropping and removal of diseased leaves on incidence and severity of leaf spot disease of *Telfairia occidentalis* Hook f. caused by *Phoma sorghina*

Nwugo MI, Ihejirika GO*

Department of Crop Science and Technology, Federal University of Technology, POB 1526, Owerri, Nigeria

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Abstract

Telfairia occidentalis Hook f. was inter-cropped with cassava, maize and yam in the field to determine the effects of removal of diseased leaves and inter-cropping on the incidence and severity of leaf spot disease caused by *Phoma sorghina*. Removal of diseased leaves every two weeks significantly reduced the incidence and severity of leaf spot disease of fluted pumpkin. Yield was also affected by the interval of leaf removal. Inter-cropping of fluted pumpkin with cassava, maize and yam reduced the incidence and severity of leaf spot disease. The least marketable yield was obtained in the fluted pumpkin, cassava, yam and maize inter-crop. The two cultural practices, removal of diseased leaves and inter-cropping can be utilized by the rural farmers in Nigeria to reduce the incidence and severity of leaf spot disease of fluted pumpkin. [Life Science Journal. 2008; 5(2): 81 – 83] (ISSN: 1097 – 8135).

Keywords: *Telfairia occidentalis*; inter-cropping; leaf spot disease; removal

1 Introduction

Fluted pumpkin, *Telfairia occidentalis* is widely cultivated in Southern Nigeria, for its edible leaves and seeds. In Southeastern Nigeria, vegetable gardens may have pumpkin as the sole crop or it may be inter-cropped with other crops like yam, cassava and maize. Fluted pumpkin is normally established between May and July so as to be available during the dry season when leafy vegetables are scarce.

The most important disease of fluted pumpkin is the leaf spot disease, which was reported to reduce the productivity and market value of the crop. Maduewesi (1977), Nwugo and Atu (1987) and Nwugo (1992) also reported that spraying at bi-weekly intervals with Benlate, captan and anvil significantly reduced leaf spot disease of fluted pumpkin in the field. Plant growth and marketable yields were observed to be better for fluted pumpkin planted in April than those planted in June, August or September. Similarly, the incidence and severity of leaf spot disease was higher for the April planting than other planting was.

Kannaiyan *et al* (1988) reported that there was no significant differences in leaf spot severity between sole crop groundnuts and those inter-cropped with maize, sorghum, pigeon pea, sunflower or cotton. But did not observe any difference in leaf spot development or severity in groundnuts when grown as an inter-crop with millet or sorghum. Removal of older plantain leaves alone was not effective in reducing incidence and severity of the sigatoka disease of plantain. However, at low or moderate cropping densities, 1600 – 2500 plants/ha, removal of both older leaves and middle portion leaves reduce both incidence and severity. Inter-cropping young plantains with cassava reduce disease incidence and severity.

This experiment was conducted to find the effect of removal of disease leaves and inter-cropping on the incidence and severity of leaf spot disease of *Telfairia occidentalis*.

2 Materials and Methods

The two experiments were conducted on the Federal University of Technology Farm located in Owerri, Nigeria (05°27' N; 07°02' E) in a sandy loam soil during the

*Corresponding author. Email: ihagab@yahoo.com

2000 and 2001 growing seasons. The crop was planted in May of each year and the growth and performance of the local variety “Mgbirichi”, was monitored till mid-dry season in February.

The first experiment on the effect of leaf removal on the incidence and severity of leaf spot disease of *Telfairia occidentalis* was a Latin square with five treatments consisting of the following T₁ – leaf removal every 2 weeks; T₂ – leaf removal every 4 weeks; T₃ – leaf removal every 6 weeks; T₄ – leaf removal every 8 weeks and control (T₀) (*Telfairia occidentalis*) no removal of leaves. These treatments were imposed after first general harvest at 10 weeks after planting. In the second experiment on the effect of inter-cropping on the incidence and severity of leaf spot disease, fluted pumpkin was inter-cropped with cassava TMS 30572 (a tall growing, high yielding variety with watery tubers and green petiole); white yam – *Dioscorea rotundata* and maize, FARZ 21. Monocropping and inter-cropping with cassava, yam, maize were arranged in the main plots.

In both experiments there were 25 plants/plot. Four weeks after planting a basal dressing of N (60 kg/ha ammonium soleplate), P (60 kg/ha as P₂O₅) and K (80 kg/

ha as K₂O) was applied to all plots. The plots were hand weeded 5 times during the growth of the crop.

Observations on leaf spot were recorded on individual plants. Diseased incidence was measured as a percentage of diseased plants in the experimental plots, while disease severity was scored at intervals on a 3 point scale where 0 – healthy; 0.75 – mild infection; 1.0 moderate infection; 2.0 – severe infection and 3 – very severe infection. Fluted pumpkin pods and leaves were harvested from the experimental plots at maturity and analyzed for pod weight and fresh weight of marketable leaves. Data were analyzed statistically by subjecting to analysis of variance to test significance of treatment effects.

3 Results

Yields in terms of marketable fresh weight and pod yield were highly significantly influenced by the interval of leaf removal. Total yield showed significant difference between treatments (Table 1). Removal of diseased leaves every two weeks significantly affected marketable fresh weight of the crop. Disease incidence and severity on

Table 1. Effects of removal of diseased leaves on the yield components/plants, incidence and severity of leaf spot disease of *Telfairia occidentalis*

Interval between leaf removable (weeks)	Pod weight (kg)	Number of seed/pod	Disease incidence (%)	Disease severity index	Marketable fresh weight (kg)
0	8.6 ^a	76 ^a	52.8 ^a	3.0 ^a	7.4 ^a
2	9.6 ^b	10 ^{ab}	12.8 ^b	0.9 ^b	10.8 ^b
4	10.8 ^b	98 ^c	14.6 ^b	1.2 ^c	9.6 ^c
6	12.6 ^c	112 ^d	32.4 ^c	2.2 ^d	8.6 ^c
8	13.8 ^d	118 ^d	48.6 ^d	2.8 ^c	7.2 ^d

Means followed by the same letter do not differ significantly at $P = 0.05$ according to Duncan's New Multiple Range Test.

Table 2. Effect of inter-cropping fluted pumpkin with Cassava, maize and yam on the yield, incidence and severity of leaf spot disease of *Telfairia occidentalis*

Crop mixture	Pod weight (kg)	Number of seed/pod	Marketable fresh weight (kg)	Disease incidence (%)	Disease severity score
Maize-cassava-yam- <i>Telfairia</i>	6.8 ^a	98 ^a	3.2 ^a	4.8 ^a	0.8 ^a
Cassava-yam- <i>Telfairia</i>	8.6 ^b	120 ^b	4.8 ^b	4.6 ^a	0.9 ^a
Maize-yam- <i>Telfairia</i>	8.4 ^b	116 ^b	7.6 ^c	12.6 ^b	1.2 ^b
Cassava- <i>Telfairia</i>	7.2 ^c	108 ^c	5.4 ^d	7.8 ^c	0.8 ^c
Yam- <i>Telfairia</i>	8.6 ^d	118 ^d	6.2 ^c	24.6 ^d	2.2 ^d
Maize- <i>Telfairia</i>	6.8 ^c	92 ^c	8.6 ^f	13.6 ^c	1.8 ^c
<i>Telfairia</i> only (control)	9.8 ^f	136 ^f	9.6 ^e	48.6 ^f	2.8

Means followed by the same letter do not differ significantly at $P = 0.05$ according to Duncan's New Multiple Range Test.

plants in which the leaves were removed every two weeks did differ significantly from those plants with their leaves intact. The lowest incidence was observed in plots where leaves were removed every two or four weeks.

Results of the effect of inter-cropping fluted pumpkin with cassava, maize and yam (Table 2) showed that inter-cropping significantly affected the yield, diseases incidence and severity. The lowest percentage incidence and severity score were obtained in the maize-cassava-yam-*Telfairia* crop combination. *Telfairia* is a climber and does well if staked, cassava as a stake for the crop significantly affected the yield of marketable leaves and pod production. The least yield was obtained in maize-cassava-yam-*Telfairia* plots. There was a significant difference in the severity of the disease between sole crops *Telfairia* and those inter-cropped with maize, yam and cassava.

4 Discussion

The results on the effect of removal of diseased leaves on the leaf spot disease of fluted pumpkin showed that disease incidence, severity and yield were significantly affected by removal of disease leaves every two or four weeks. Meredith (1970) recommended that badly spotted leaves and leaf trash be removed from banana plants and destroyed. It was reasoned that the inoculum especially aeciospores would be substantially reduced. Removal of older plantain leaves alone was not effective in reducing incidence and severity of sigatoka disease. They reported that at low or moderate cropping densities, 1600 – 2500 plants/ha, removal of older and middle portion leaves reduced disease incidence. Two-weekly harvests gave a significantly higher total dry matter yield than the 6 and 8 weekly harvests. Asiegbo (1983) reported that frequent harvests (3 or 4 week intervals) yielded more edible leaves than infrequent harvests (6 or 8 week intervals). Frequent harvest, induce greater branching, allowing for more flushes.

Kanaiyan *et al* (1988) reported that there was no significant difference in leaf spot severity between sole crop groundnuts and those inter-cropped with maize, sorghum, pigeon pea, sunflower or cotton. Results obtained in this

investigation showed that inter-cropping fluted pumpkin with cassava, yam and maize had significant effect on the leaf spot disease of *Telfairia occidentalis*. The pathogens that cause leaf spot disease of fluted pumpkin are wind-borne. It is likely that the other crops in mixture prevented contact between the wind-borne pathogens and fluted pumpkin, thus reducing the incidence and severity of the disease. Arene (1976) reported that mixed cropping with melon (*Colocynthis citrullus* (L.) kuntze) and maize (*Zea mays* L.) reduced incidence of cassava bacterial blight in cassava plots. In traditional farming systems, fluted pumpkin is grown as a minor crop at wide spacing among field crops. It is normally planted among yam with which it shares common stakes, maize and cassava plant. Mixed cropping with fast growing, dense canopied cassava TMS 30572 was beneficial in reducing incidence and severity of black sigatoka disease on plantains at establishment phase.

It appears that these cultural practices, removal of disease leaves and inter-cropping with yam maize and cassava can be utilized to reduce the incidence and severity of leaf spot disease of fluted pumpkin.

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