Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.13, 2015

Effect of Poultry Manure on Incidence and Severity of Foliar Diseases and Weed of *Telfairia occidentalis* (Ugu) Intercropped with Cassava and Maize

O. J. Orji, I. I. Ibeawuchi, and O. P. Obilo
Department of Crop Science and Technology, Federal University of Technology, P.M.B. 1526, Owerri, Imo State, Nigeria.

Abstract
Fluted pumpkin is dominantly grown in mixtures and sometimes sole in Southeastern Nigeria. However the yield and quality of Telfairia in these mixtures are unknown. The study investigated the effect of different rates of poultry manure and intercropping on foliar disease severity and weed incidence of *Telfairia occidentalis*. The field was laid out in a 4 x 5 factorial arrangement fitted into a randomized complete block design and replicated three times. The treatments consist of five levels of organic manure (0, 2.5, 5, 7.5, 10) t/ha which were applied on four intercrop combinations (Telfairia-sole; Telfairia and cassava; Telfairia and maize; Telfairia, cassava and maize). The parameters assessed were leaf spot disease, leaf blight disease and weed incidence. The result showed that the intercrop had a significant effect on disease and weed incidence whereas Telfairia-sole recorded the highest foliar disease with values of 2.73, 2.80, 3.40 for leaf spot; 2.60, 2.93, 3.26 for leaf blight; and 31.47, 69.70, 123.5 for weed incidence at 4, 8 and 12 weeks after emergence (WAE). Poultry manure recorded no significant effect on leaf spot disease and weed incidence at 4 and 8 WAE but recorded a significant effect on leaf spot disease with the highest value of 2.92 at poultry manure rate of 0.0 t/ha at 12 WAE. The interaction recorded no significant effect.
Keywords: *Disease, Severity, Weed, Incidence, Poultry, Manure, Intercropping*

1. Introduction

Intercropping is a common feature of Agriculture in tropical Africa as well as in the Asian and American tropics (Papendick *et.al*.,1976; Okigbo, 1978; Kurt, 1984 and Dalrymple, 1971). According to Ibeawuchi, (2007), intercropping is the growing of two or more crops in proximity to promote interaction between them. Grimes, (1963) defined intercropping as the system of growing different crops in alternate rows, as alternate row cropping. The system has evolved in different areas and is so deeply established among peasant farmers that a complete change of the system may not be acceptable to most farmers (Nnko and Doto, 1980).

The rationale for crop mixtures are that they may be relatively more profitable than sole cropping, they are consistent with the goals of food security and year-round subsistence needs (Andrew, 1972) and may alleviate adverse conditions in the ecosystem, maximize the space, water, and nutrients available. The disadvantages of intercropping systems are reduced yield of the component crops (Webster and Wilson, 1966; Agboola and Fayemi, 1971); competition for light, nutrients, and water (Dalal, 1974; Willey, 1979).

In addition to all the advantages of intercropping, it is still necessary to improve intercropping in order to attain maximum yield since intercropping maximizes the use of soil nutrients. Hence, addition of organic fertilizer in order to boost the organic matter content in the soil during intercropping is important.

Poultry manure is rich in organic manure because solid and liquid waste is excreted together resulting in no urine loss (Amanullah *et.al.,*2010). Generally, Poultry manure application improves the physical properties of the soil. It significantly decreases bulk density and increases total porosity, infiltration capacity and water holding capacity Amanullah *et. al*.,(2010). Poultry manure showed better performance in producing maize, vegetables and tubers (cassava) yield (Akande *et. al.,* 2005; Amanullah *et. al*., 2007).

Telfairia occidentalis Hook f. known as fluted pumpkin is a member of cucurbitaceae family. It is one of the commonly consumed leafy and seed vegetables in Nigeria and is predominantly distributed around the tropics, (Renner *et. al.,* 2007). It has been suggested that it originated in south-east Nigeria and was distributed by the Ibos, (Kayode and Kayode, 2011).The largest diversity in plant populations can currently be found in Imo state and other areas in South-eastern Nigeria (Olaniyi and Odere, 2009).

Telfairia occidentalis is rich in iron and play a key role in the cure of anaemia; they are also noted for lactating properties and are in high demand for nursing mothers (Okoli and Mgbeoku, 1983). It has the highest vitamin A content, (Williams *et. al.,* 2009) and the seeds are very rich in oil, especially unsaturated fatty acids which form 61% of the oil (Odoemena and Onyeneke, 1998; Okoli and Nyanaya, 1988).

The purpose of this study therefore is to evaluate the incidence and severity of foliar diseases and weed of *Telfairia occidentalis* in mixture and sole.

2. Materials and Methods

The experiment was conducted in 2013 cropping season at the Teaching and Research Farm, School of Agriculture and Agricultural Technology, Federal University of Technology Owerri, Imo state. Owerri is in the humid forest zone of Southeastern Nigeria and it is located on latitude 5^0 27' 50.23" North and longitude 7^0 02'49.33" (Nwosu and Adeniyi, 1980).

2.1 Land Preparation

The land measuring 42 by 42 meters was cleared manually and tilled to make seed beds which were 4 m long and 2 m wide and constituted a treatment plot that had a space of 0.5 m between each plot and a space of 1.0 m between the blocks. Poultry manure was cured under shade for four weeks, thoroughly mixed, measured, applied according to treatments and was incorporated into the soil with the use of garden fork. Soil samples were randomly collected from the experimental site and analyzed for the experiment.

2.2 Treatments and Experimental Design

Total of 20 treatments were laid out in a 4 x 5 factorial arrangement fitted into a randomized complete block design. Factor A consisted of four production systems (Telfairia – sole; Telfairia and cassava; Telfairia and maize; and Telfairia, cassava and maize) and factor B comprised of five levels of poultry manure; 0, 2.5, 5.0, 7.5 and 10t/ha respectively and replicated three times.

2.3 Planting and planting materials

The seeds of Telfairia, maize (Oba 2) and cassava cuttings (NR 8082) were collected from the genetic resource unit of Department of Crop Science, Federal University of Technology, Owerri. The healthy Telfairia pods were processed for seeds which were shade dried for 2 days to reduce moisture and prevent decay. In both sole and intercrops, Telfairia was spaced 2.0x2.0m, cassava was cut 20cm and planted at 1.0x1.0m and maize was sown at 0.75x0.25m respectively. Weeding was done manually at 5 and 12 weeks after planting using hoe.

2.4 Disease Severity and Weed Incidence

Disease severity was scored at intervals on a 5 point scale (Nwufo and Ihejirika, 2008).

Severity Estimation (%)	Scale	Interpretation
0	0	No infection
1-20	1	Slight infection
21-40	2	Moderate infection
41-60	3	Severe infection
61-80	4	Very severe infection
81-100	5	completely infected

Weeds were counted using a quadrat and the weeds that fell within the quadrat were counted and recorded per plot.

3. Results and Discussion

The intercropping effect on leaf spot, leaf blight disease and weed incidence as seen in Tables 1, 2 and 3, had significant difference between the treatment means where Telfairia - sole recorded the highest leaf spot disease with severity score of (2.73), this was followed by Telfairia and cassava intercrop (2.67) while Telfairia, cassava and maize mixture recorded the least leaf spot disease with a severity score of (1.87) at 4 weeks after emergence (WAE). At 8 WAE, Telfairia - sole recorded the highest leaf spot disease with a severity score of (2.80), followed by Telfairia and cassava; Telfairia, cassava and maize recorded the least (1.80). At 12 WAE, the intercrop showed Telfairia - sole having the highest leaf spot disease with a severity score of (3.40) and the least at Telfairia and maize (1.93). These findings are in line with the investigations of Nwufo and Ihejirika (2008) who reported that intercropping Telfairia has significant effect on leaf spot disease of Telfairia. They also stated that the pathogen that causes leaf spot disease of Telfairia are wind-borne, it is likely that other crops in the mixture prevented contact between the wind-borne pathogen and Telfairia thus, reducing the incidence of the disease. Poultry manure had significant effect on leaf spot disease at 4 WAE and the highest severity score of leaf spot disease (2.67) was recorded at the plot that received 0.0 t/ha poultry manure followed by those that received 2.5t/ha and was least (2.25) at 7.5 t/ha poultry manure. At 8 WAE, the effect of poultry manure showed that the plot treated with 0.0t/ha poultry manure recorded the highest leaf spot disease with a severity score of (2.58), followed by the plots that received 2.5 t/ha while those in the plot that received 10.0 t/ha of poultry manure recorded the least severity score (2.08). At 12 WAE, plots treated with 0.0 t/ha poultry manure had the highest leaf spot disease severity score (2.92) with the least at plots treated with 7.0 t/ha. These findings

corresponds with the research done by Luong and Huong (2005) who reported that the population of insect pests like stem borer (SB), brown plant hopper (BPH) and leaf folder (LF) on a chemical fertilizer treatment exhibited a severe outbreak more than in the treatments with chicken and hog manure.

At 4 WAE, intercrop had a significant effect on leaf blight disease in Table 3 whereas leaf blight disease had the highest severity score of (2.6) in Telfairia -sole while the least (2.00) was observed at Telfairia, cassava and maize intercrop. This was also the case at 8 WAE but at 12 WAE Telfairia - sole recorded the highest leaf blight disease with a severity score of (3.26) followed by Telfairia and cassava and the least (2.40) in Telfairia, cassava and maize intercrop. These findings contradicts the research by Kanaiyan *et al* (1988) who 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. 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. The effect of poultry manure at 4 WAE showed the highest severity score of leaf blight disease at (2.67) on the plot that received 0.0 t/ha, followed by 2.5 t/ha and the least (2.17) was observed at 7.5 t/ha. At 8 WAE, the highest leaf blight disease with severity score of (3.00) was observed at the plot treated with 0.0 t/ha, followed by 2.5 t/ha and the least (2.40) was at 7.5 t/ha. At 12 WAE, the highest severity score was recorded at the plot that received 5.0 and 7.5 t/ha.

At 4, 8 and 12 WAE, the highest (31.47) weed incidence was observed in Telfairia sole at 4 WAE; (69.70) at 8 WAE and (123.5) at 12 WAE while Telfairia, cassava and maize intercrop had the least weed incidence with values of (23.47) at 4 WAE; (55.60) at 8 WAE and (87.3) at 12 WAE. These findings are in line with the report by Ibeawuchi and Ofoh (2003) which stated that most crop combinations suppress weed growth by providing an early ground cover due to high plant population or fast growing component crop. The findings also correspond with the statement made by Chaud and Sharma, (1977) that there were pest (weed) reduction in all intercropping involving maize and another crop when compared to maize grown sole.

4. Conclusion

Poultry manure is an effective source of N, P, K, Ca and Mg and organic matter for Telfaria production therefore, the fertility of the soil could be sustained with intercropping and the addition of poultry manure for good and quality leaf yield of *Telfairia occidentalis.*

Reference

Agboola, A. A. and Fayemi, A. A., (1971). Preliminary trials on the intercropping of maize with different tropical legumes in Western Nigeria. *Journal of Agricultural Science* (England), 77, 219-225

Akande, M.O., J.A. Adediran and F.I. Oluwatoyinbo, (2005). Effects of rock phosphate amended with poultry manure and soil available P and yield of maize and cowpea. *Afr. J. Biotech*., 4: 444-448.

Amanullah, M.M., K. Vaiyapuri, K. Sathyamoorthi, S. Pazhanivelan and A. Alagesan, (2007). Nutrient uptake, tuber yield of cassava (Manihot esculenta Crantz.) and soil fertility as influenced by organic manures. *J. Agron*., 6: 183-187

Amanullah, M.M., S. Sekar and P. Muthukrishnan, (2010). Prospects and potential of poultry manure. *Asian J. Plant Sci*., 9: 172-182.

Andrew, D.J., (1972) Intercropping with sorghum in Nigeria. *Expt. Agric.* 8: 139-150

Arene O.B., (1976) Influence of Shade and Inter-cropping on the Incidence of Cassava Bacterial Blight Caused by Xanthomonas monihorthis. In: Proceeding of the Cassava Bacterial Blight Workshop, International Institute of Tropical Agriculture, Ibadan, Nigeria. 28 – 9.

Chaud, P. and Sharma, N.N. 1977. *Influence of crop association in insect pest incidence*. Proceedings, Indian National Science Academy 43 (Part 3).

Dalal, R.C., (1974). *Effect of intecropping maize with pigeon peas on grain yield and nutrient uptake*. Experimental Agriculture 10: 219-224.

Dalrymple D.G., (1971). Survey of Multiple Cropping in less Developed nations. Economic Research Service. USDA Washington D.C.

Grimes,R.C., (1963). Intercropping and alternate row cropping of cotton and maize. *East African Agricultural and Forestry Journal, 28, 161-163.*

Ibeawuchi,I.I., (2007) Intercropping - A Food Production Strategy for the Resource Poor farmer. *Nature and Science,* 5(1):46-59

Ibeawuchi, I.I and Ofoh, M .C.(2003). Effects of maize/cassava/food legume mixtures in soil nutrient status and weed control. *Bionature* 23 (2) 59-64

Kannaiyan J, Sandhu RS, Haciwa HC and Raddy MS.(1988) Management of Leaf Spots of Groundnut in Zambia. In: Proceedings of the Third Regional Groundnut Workshop, Lilongwe, Malawi.

Kayode A.A.A. and O.T. Kayode (2011) Some medicinal values of *Telfairia occidentalis*:A Review. *American Journal of Biochemistry and Molecular Biology* 1 (1):30-38

Kurt, G.S. (1984). Intercropping in tropical smallholder agriculture with special reference to West Africa. GTZ pp 1-233.

Nnko E.N. and Dato A.L., (1980) Intercropping maize with soybean: In proceedings of the symposium on intercropping in Semi-Arid areas held at Morogoro, Tanzania. Pp 33-36

Nwosu A.C and Adeniyi E.O ,(1980) Imo State: A Survey of Resourcrs for Development. Nigeria Institute for Social and Economic Research. (NISER), Ibadan Nigeria Pp 310.

Nwufo M.I and Ihejirika G.O, (2008) 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 *Life Science Journal*. 5(2): 81 – 83

Odoemena, C.S. and E.C. Onyeneke, (1998) Lipids of Fluted Pumpkin(*Telfairia occidentalis*) seeds. Proceedings of the 1st African Conference in Biochemistry of Lipids, (ACBL'98) Ambik press, Benin city, Nigeria. Pp 147-151

Olaniyi, J.O.and Odedere M. P. (2009). The effects of mineral N and compost fertilizers on the growth, yield and nutritional values of fluted pumpkin (Telfairia occidentalis) in south western Nigeria. *Journal of Animal & Plant Sciences*, Vol. 5, Issue 1: 443 - 449.

Okigbo, B.N., (1978). Cropping systems and related research in Africa. AAASA occasional Publications series.

Okoli, B.E. and C.M. Mgbeogu, (1983). "Fluted Pumpkin Telferia Occidentalis: West African Vegetables." *Economic Botany*, 3(7): 145 – 149.

Okoli, B.E. and B.L. Nyanayo, (1988). Polynology of Telfairia L. (Cucurbitacae). *Folia Geobotanica et Phytotaxonomica*. 23: 281-286.

Papendick, R.L. Sanchez P.A., Triplett G.B. (Eds.), (1976).Multiple Cropping. ASA Special Publication. 27, *Am. Soc.Agronomy* Madison.

Rappaport, R.A.,(1968). Pigs for the Ancestors: Ritual in the Ecology of a New Guinea people. New Haven, Connecticut, USA:Yale University Press. 311 pp.

Renner SS, Scaefer H. & Koccyan A, (2007): Phytogenetics of cucumis (curcurbitaceae). In Olaniyi, J.O.and Odedere M. P., (2009) The effects of mineral N and compost fertilizers on the growth, yield and nutritional values of fluted pumpkin *(Telfairia occidentalis)* in south western Nigeria. *Journal of Animal & Plant Sciences*, Vol. 5, Issue 1: 443 - 449.

Webster and Wilson, (1966) Agriculture in the Tropics. London: Longman, Pp 488, 63s

Willey, R.W., (1979). Intercropping—Its Importance and Research Needs. Part 1. Competition and yield advantages. Field Crop Abstract, 32, 1-10.

Williams, I.O., R.S. Parker and J. Swanson, (2009) Vitamin A content of southeastern Nigerian vegetable dishes, their consumption pattern and contribution to vitamin A requirement of pregnant women in Calabar Urban, Nigeria. *Pak. J. Nutr.*, 8:1000-1004

TABLES

TABLE 1: Effect of Poultry Manure Rates and Intercropping on Weed Incidence per Plot of *Telfairia* at 4, 8 and 12WAE

	MANURE RATE t/ha					
Intercrop	**0.00**	**2.50**	**5.00**	**7.50**	**10.00**	**Mean**
4WAE						
Telfairia (sole)	32.00	31.30	30.30	36.00	27.70	**31.47**
Telfairia + Cassava	29.70	32.00	24.30	25.00	18.00	**25.80**
Telfairia + Maize	28.70	36.70	21.30	23.00	31.30	**28.20**
Telfairia+Cassava+maize	28.70	19.70	25.70	22.70	20.70	**23.47**
Mean	**29.75**	**29.92**	**25.42**	**26.67**	**24.42**	
LSD (0.05) for manure rate			=	N.S		
LSD (0.05) for intercrop			=	N.S		
LSD (0.05) for manure rate X intercrop			=	N.S		
8 WAE						
Telfairia (sole)	74.30	70.30	67.70	63.00	73.30	**69.70**
Telfairia + Cassava	67.00	65.00	73.70	61.00	59.00	**65.10**
Telfairia + Maize	58.70	50.70	65.00	58.30	62.00	**58.90**
Telfairia+Cassava+maize	58.00	57.70	54.30	50.70	57.30	**55.60**
Mean	**64.50**	**60.90**	**65.20**	**58.20**	**62.90**	
LSD (0.05) for manure rate			=	N.S		
LSD (0.05) for intercrop			=	8.34		
LSD (0.05) for manure rate X intercrop			=	N.S		
12 WAE						
Telfairia (sole)	131.3	113.7	126.3	130.0	116.3	**123.5**
Telfairia + Cassava	109.7	112.3	117.0	129.0	114.3	**116.5**
Telfairia + Maize	113.0	109.7	102.3	108.7	112.3	**109.2**
Telfairia+Cassava+maize	85.0	80.7	92.7	82.3	95.7	**87.3**
Mean	**109.7**	**104.1**	**109.6**	**112.5**	**109.7**	
LSD (0.05) for manure rate			=	NS		
LSD (0.05) for intercrop			=	11.92		
LSD (0.05) for manure rate X intercrop			=	N.S		

TABLE 2: Effect of Poultry Manure Rate and Intercropping System on Leaf Spot Disease of *Telfairia* at 4, 8 and 12WAE

	MANURE RATE t/ha					
Intercrop	**0.00**	**2.50**	**5.00**	**7.50**	**10.00**	**Mean**
4 WAE						
Telfairia (sole)	3.33	2.67	2.67	2.33	2.67	**2.73**
Telfairia + Cassava	2.67	2.67	2.67	2.67	2.67	**2.67**
Telfairia + Maize	2.67	2.67	2.33	2.33	2.33	**2.47**
Telfairia+Cassava+maize	2.00	1.70	2.30	1.67	1.67	**1.87**
Mean	**2.67**	**2.42**	**2.50**	**2.25**	**2.33**	
LSD (0.05) for manure rate			=	0.41		
LSD (0.05) for intercrop			=	N.S		
LSD (0.05) for manure rate X intercrop			=	N.S		
8 WAE						
Telfairia (sole)	3.00	3.00	2.67	2.67	2.67	**2.80**
Telfairia + Cassava	2.67	2.67	2.33	2.33	2.33	**2.47**
Telfairia + Maize	2.67	2.33	2.33	2.00	1.67	**2.20**
Telfairia+Cassava+maize	2.00	1.67	2.00	1.67	1.67	**1.80**
Mean	**2.58**	**2.42**	**2.33**	**2.17**	**2.08**	
LSD (0.05) for manure rate			=	N.S		
LSD (0.05) for intercrop			=	0.37		
LSD (0.05) for manure rate X intercrop			=	N.S		
12 WAE						
Telfairia (sole)	3.67	3.33	3.33	3.33	3.33	**3.40**
Telfairia + Cassava	3.00	2.67	2.67	2.33	2.67	**2.67**
Telfairia + Maize	2.33	2.00	2.00	1.67	1.67	**1.93**
Telfairia+Cassava+maize	2.67	2.33	1.67	1.67	1.67	**2.00**
Mean	**2.92**	**2.58**	**2.42**	**2.25**	**2.33**	
LSD (0.05) for manure rate			=	0.47		
LSD (0.05) for intercrop			=	0.42		
LSD (0.05) for manure rate X intercrop			**=**	**N.S**		

TABLE 3: Effect of Poultry Manure Rate and Intercropping System on Leaf Blight Disease of Telfairia at 4, 8 and 12WAE

	MANURE RATE t/ha					
Intercrop	**0.00**	**2.50**	**5.00**	**7.50**	**10.00**	**Mean**
4 WAE						
Telfairia (sole)	3.00	2.67	2.33	2.33	2.67	**2.60**
Telfairia + Cassava	2.67	2.67	2.67	2.33	2.33	**2.53**
Telfairia + Maize	2.67	2.33	2.33	2.00	2.33	**2.33**
Telfairia+Cassava+maize	2.33	2.33	1.67	2.00	1.67	**2.00**
Mean	**2.67**	**2.50**	**2.25**	**2.17**	**2.25**	
LSD (0.05) for manure rate			=	N.S		
LSD (0.05) for intercrop			**=**	**0.42**		
LSD (0.05) for manure rate X intercrop			=	N.S		
8 WAE						
Telfairia (sole)	3.33	3.00	3.00	2.67	2.67	**2.93**
Telfairia + Cassava	3.00	3.00	2.67	2.33	2.67	**2.73**
Telfairia + Maize	3.00	3.00	2.67	2.67	2.67	**2.80**
Telfairia+Cassava+maize	2.67	2.67	2.00	2.00	2.00	**2.27**
Mean	**3.00**	**2.90**	**2.58**	**2.42**	**2.50**	
LSD (0.05) for manure rate			=	0.43		
LSD (0.05) for intercrop			=	0.38		
LSD (0.05) for manure rate X intercrop			=	N.S		
12 WAE						
Telfairia (sole)	3.67	3.67	3.00	3.00	3.00	**3.26**
Telfairia + Cassava	3.00	3.00	3.00	2.67	2.67	**2.87**
Telfairia + Maize	2.67	2.33	2.67	2.67	3.00	**2.67**
Telfairia+Cassava+maize	2.67	2.67	2.00	2.33	2.33	**2.40**
Mean	**3.00**	**2.92**	**2.67**	**2.67**	**2.75**	
LSD (0.05) for manure rate			=	N.S		
LSD (0.05) for intercrop			=	0.34		
LSD (0.05) for manure rate X intercrop			=	N.S		

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar