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INCIDENCE SURVEY AND SEVERITY OF FUNGAL DISEASES OF RICE IN RICE GROWING AREAS OF SOUTH-EASTERN NIGERIA

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Running Title: Investigation on Seed Health Test of Rice Seeds and Plant Materials for Fungi Disease

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ABSTRACT

There has been a low productivity experienced by rice farmers in South Eastern Nigeria as a result of high infestation of pests and diseases caused majorly by fungal pathogens. This research was aimed at pulling together the fungi pathogens associated with rice plants through a comprehensive survey in such a way that one could see at a glance what the problems of fungi diseases look like in the zone. Two middle diagonal lines were drawn (in each plot of rice at distance of 20 cm) along the transverse and sampled. Disease incidence was assessed by visual observation of rice diseases in the fields. Data collected were subjected to ANOVA in RCBD using Gen Stat. 7.2 DE version (2007). Mean separation was done using Fisher's Least Significant Difference (F-LSD) at 5% level of probability. Incidence and severity of rice diseases was as high as 98.60% and 3.20, respectively. The most important diseases were seed rot caused by Fusarium moniliforme followed by leaf rot caused by Helminthosporium oryzae. Fusarium moniliforme was the most frequently occurring. Out of the fungi belonging to nine genera Fusarium moniiforme was highest in Abia, Helminthosorium oryzae was highest in Anambra,State and Trichoconis padiwickii was highest in Ebonyi. Phoma oryzae occurred most in Enugu State while Fusarium oxysporim was highest in Imo state.

Keywords: Rice seeds, disease survey, disease incidence and severity, seed health test, pathogenicity, fungi isolation and microscopic identification

INTRODUCTION

Nigeria is a net importer of rice, being the third largest importer of rice in the world (Awoderu, 1974). The annual rice consumption of rice is put at 5.4 million Metric tons. The nation imports 3.1 million Metric tons annually, leaving 2.3 million Metric tons to be produced locally (Ademola 2019). Therefore, rice is a premium commodity in Nigeria, being consumed by people of all classes and status as staple food and any effort to boost its productivity is a step in the right direction. According to Samson and Kadiri (2007), the second most serious problem confronting Nigerian farmers is the devastation by pests and diseases. Reports of Awoderu (1974) have shown that diseases caused by fungal pathogens contributes up to forty-three percent of losses encountered by rice farmers in Nigeria. This is made more impactful as a result of problems of inadequate control measures for pests and diseases experienced by most rice farmers (Gatachew *et al*. 2014).

Investigation towards identifying the various fungi pathogens that cause economic losses in rice production in the South- eastern Nigeria

will obviously form a background for proper disease management strategy geared towards removing the impediment.

Disease survey is carried out by determining the incidence and severity of any particular disease (Olmstead *et al* 2001). Disease assessment scales are often used for disease incidence and severity measurement (Butt *et al.* 2011). There are two general types of disease assessment scales: qualitative scales used as a subjective division of disease severity into levels and quantitative scales based on a quantitative trait, for example percentage of the plant or plant part diseased. Olmstead *et al* (2001). Considered some methods of visual assessment: digital image analysis and digital image analysis after painting the disease colonies on the leaf disk. According to Bock *et al.,* (2010) both visual estimation of disease and using Cameras or any other imaging technologies to measure disease can be considered as remote sensing.

This will help to understand the epidemiology of fungal diseases of rice in the area, which will invariably enable Plant Protectionists to plan how to break the link in the transmission of the diseases from rice seeds to nurseries, fields and post-harvest stores thereby reducing the economic losses resulting from fungal disease infestations to the barest minimum.

A study was therefore conducted to obtain a comprehensive incidence and severity survey of fungal pathogens of rice plants in all the South-eastern States of Nigeria by carrying out seed heath tests to identify seed borne pathogens, isolate and identify fungal pathogens in rice nurseries, rice fields and stores.

MATERIALS AND METHODS

Study area:

Survey of the disease incidence and severity of rice was carried out in rice growing areas of Abia, Ebonyi, Enugu, Anambra and Imo States (Fig. 1) to identify fungal diseases of rice in nursery and in the field in 2009 and 2010. Four Local government areas (LGAS) in each State where rice is grown were visited as follows: Abia State: Bende, Arochukwu, Ohofia, and Umuahia South; Anambra State: Ogbaru, Ayamelum, Omambara East and West. Ebonyi State: Abakaliki, Ivo, Izzi and Ezza; Enugu State: Uzouwani, Isiuzo, Orji River and Nkanu East and Imo State: Ihitte/Uboma, Ideato North, Onuimo, and Okigwe. Five farms were sampled in each local government area.

Research procedure:

A random sampling method was used to choose the LGAS to be surveyed. Two middle diagonal lines were drawn in each plot of rice at distance of 20cm along the transverse. The survey was done during the wet months of 2009 and 2010 since rice cultivation in these areas is rain-fed. Samples of infected rice parts were collected from each LGA of each of the States and packaged separately in brown envelopes labeled accordingly and taken to the Plant Pathology Laboratory of National Root Crop Research Institute, Umudike same day for further investigation.

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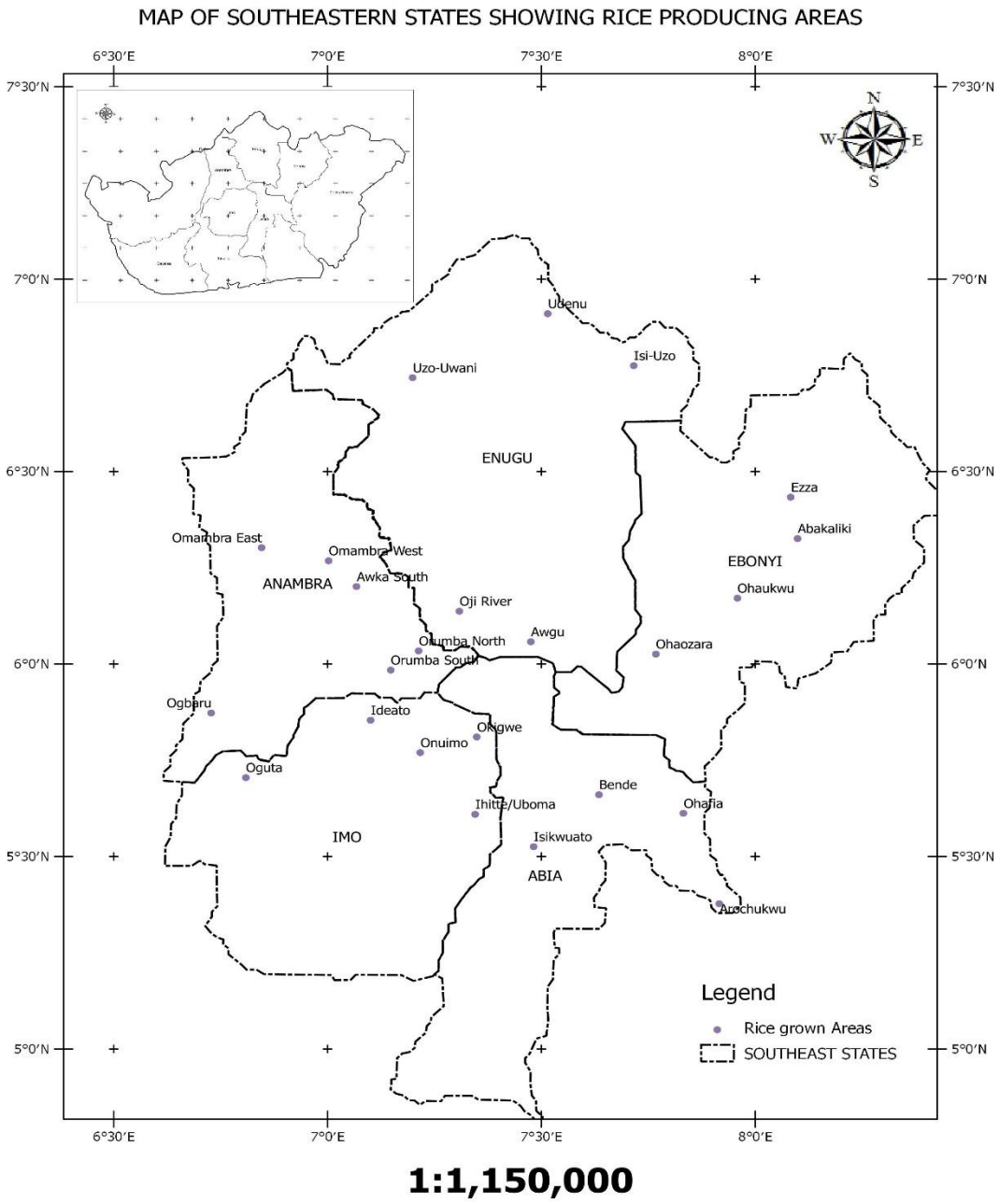

Figure 1: Map of Southeastern Nigeria showing States and locations Surveyed for fungal diseases of rice in 2009 and 2010

Source: World Bank FADAMA III map of rice producing areas of South –Eastern Nigeria.

Assessment of disease incidence and severity of individual pathogens

Assessment of disease incidence and severity was done in the farmers' farms in the study areas during the nursery and in the field stages. Disease incidence was assessed by visual observation of rice diseases in the fields sampled. Disease symptoms recorded include: sheath rot, leaf spots, lesion on leaves, culm and seed rot. For seed rot which was most prevalent in most areas visited, grey mould which was visible to the naked eyes was observed. Symptoms observed in the sheath included long blight parallel necrotic patches running from the tip to the base of leaves.

Spherical or oval shaped patches on the leaves were indication of leaf spot disease noticed in the leaves of most rice plants in the nursery. Between two hundred to four hundred rice plants were sampled in each farm. The percentage disease incidence of rice plants was determined according to Snedecor, and Cochran, (1994) as follows:

$$DI = \frac{\text{Number of Diseased Plants}}{\text{Total Number of Plants Sampled}} \times \frac{100}{1}$$

The disease severity was assessed by recording the extent or degree of the disease in the infected rice of the sampled field. A five – point scale of 0-5 was used by IRRI (2002).

Where:

0 = No infection

1 = 1 – 20% of plants infected

2 = 21 – 40% of plants infected

3 = 41 – 60% of plants infected

4 = 61 – 80% of plants infected

5 = 81- 100% of plants infected

Culture medium

Water agar was prepared by dissolving 150g of commercial agar in 1000ml of distilled water and dispensed into conical flasks of 500ml and autoclaved at 121ºC for 15 minutes and allowed to cool (Hocking *et al.* 1992). While potato dextrose agar (PDA) was prepared by dissolving 19.5g of commercial potato dextrose agar in 500ml of distilled water in a conical flask corked properly and heated in an autoclave to a temperature of 121 ºC for 15 minutes and allowed to cool (Summerbell, *et el. 1*997).

Isolation of fungi organisms from infected rice plant parts

Samples of infected rice collected from the field and nursery in each of the States and LGAs sampled were taken to the laboratory. Each was properly washed with tap water and then rinsed two times with sterile distilled water to remove soil and other particles. They were surface sterilization with 0.1% commercial bleach (Sodium hypochlorite) for five minutes and rinsed in three changes of distilled sterile water. The cut segments of the infected plant material were dried between sheets of sterile filter paper. These were later plated on water Agar which was acidified with lactic acid and incubated for 7 days at room temperature (27±2°C). With a flamed sterile cork borer, 3mm agar plugs were collected from the actively growing cultures of the suspected fungal organisms and transferred onto Potato Dextrose Agar (PDA) medium acidified with three drops of lactic acid in 9cm Petri dishes. The cultures were incubated for 7 days at a temperature of 27 ± 2ºC. Pure cultures of the isolates were obtained by successive sub-culturing (Hocking, *et.al*.,1992 and Harris,1986). Stock cultures of the isolates were maintained by aseptically inoculating the hyphal tips of the fungal isolates onto PDA agar slants in MacCarthney bottles. The cultures were allowed to grow in the incubator for five days at a temperature of 27ºC after which they were preserved in the refrigerator at 10ºC for subsequent use. The available rice seed varieties collected from the rice farmers in each local government area of the respective States sampled were used for the seed health testing and they were: FARO 48, Local variety, BG 90, FADAMA, FARO 57, FARO 51, IR1416, FARO 52, FARO 15, NERICA, SML, FARO 44 and R-BUS.

A total of 400 seeds were used for each sample. Pathogenicity test for the isolated fungi was also carried out through foliar application method. Compound microscope (Olympus XL) connected to a Desktop computer and camera was used to obtain the

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Micrographs of each identified fungi organism. Identification was based on the morphological and reproductive structure / features of each fungus from respective LGAS and States sampled.

Statistical analysis: Data collected were subjected to ANOVA in RCBD using GenStat 7.2DE version. Mean separation was done using Fisher's Least Significant Difference (F-LSD) at 5% level of probability

RESULTS

Major rice diseases of rice growing areas in South Eastern Nigeria

The result in Table 1 shows that the rice disease that had the highest disease incidence was seed rot (false smut) followed by leaf rot. The least was leaf blight. Rice blast which is one of the most devastating diseases of rice in South- Eastern Nigeria and the world in general had a percentage occurrence of 12.43%. It was observed in few Local government areas of South-Eastern Nigeria. Sheath rot (10.36%), stem rot (6.18), Gall (5.18%) and root rot (5.18%) were also noticed in most of the local areas where rice is produced (Table 1).

Table 1: Major fungal diseases and causal agents in South Eastern Nigeria

Disease	States	LGA	Causal agent	Incidence (%)
Blast	Enugu Ebonyi	Uzouwani Abakiliki	*Pyricularia oryzae*	12.43
False smut	Imo Imo Anambra	Arochukwu Ideato North Ayamelum	*Ustilaginoidae virens*	31.09
Leaf rot	Imo	Arondiuzogu	*Entyloma oryzae*	28.76
Stem rot	Abia	Umuahia South	*Magnaporthe salvinia*	06.18
Gall	Enugu	Uzouwani	*Meloidogyne spp*	05.18
Leaf blight	Anambra	Ayamelum	*Rhizoctonia solani*	01.04
Sheath rot	Imo	Ideato North	*Sarocladium oryzae*	10.36
Root rot	Abia	Umuahia South	*Curvularia oryzae*	05.18
LSD (0.05)				**4.12**

Fungal pathogens associated with different growth stages of rice in various locations

Nursery and tillering stages (36.78% each) were the periods in rice growth when most of the diseases occurred. This is followed by ripening stage (10.21%) whereas the least stage of disease development is during the booting (panicle initiation) and milking (filling) stages with percentage disease incidence of 6.12% and 6.12% each (Table 2).

Table 2**: Fungal pathogens associated with different growth stages of rice in various locations**

State	LGA	Pathogens	Nursery	Tillering	Booting	Milking	Ripening
Abia	Arochukwu	*Fusarium monliforme*	-	-	+	-	+
	Bende	*Fusarium.solani*		+	+	-	-
	Ohafia	*Fusarium monliforme*	+	-	-	-	-
	Umuahia South	*Fusarium monliforme*	+	-	-	+	-
Anambra	Anaku	*Penicillium oryzae*	+	-	-	-	-
	Ifite Ogwari	*Helminthosporium oryzae*	-	+	-	-	-
	Omor	*Botridiploidia spp*	-	+	-	-	-
	Otuocha	*Botridiploidia spp*	-	+	-	-	-
Ebonyi	Abakiliki	*Trichoconis padwickii*	+	+	-	-	-
	Ezza	*Fusarium.solani*	-	-	+	-	-
	Isiagu	*Rhizopus.sporangia*	+	-	-	-	+
	Izzi	*Fusarium.monliforme*	+	-	-	-	-
Enugu	Adani	*Fusariumur.monliforme*	-	-	-	-	+
	Isiuzo	*Curvularia oryzae*	+				+
	Nkanu East	*Phoma oryzae*	-	+	-	-	-
	OjiRiver	*Aspergillus oryzae*	+	-	-	-	-
					+	-	+
Imo	Ideato North	*Fusarium moniliforme*	+	+	-	-	+
	Okata	*Fusarium monliforme*	+	-	-	-	-
	Ihite-Uboma	*Fusarium monliforme*	+	+	-	-	-
	Onuimo	*Helminthosporium oryzae*	+	-	-	+	-
% incidence		36.78%	36.78%	6.12%	6.12%	10.21%	

+ = found, - = not found

Incidence and severity of major fungal diseases of rice in South- Eastern Nigeria

The result of incidence and severity of *Fusarium moniliforme* in Abia State showed that the disease incidence is highest in Arochukwu followed by Ohofia which is not significantly higher than that of Bende. Umuahia South, recorded the least disease incidence. The disease severity was slight in all the locations in Abia State such as Arochukwu but the score in Umuahia South is statistically higher than that in Ohofia (Table 3.). There was no significant difference in the incidence of rice disease caused by *Helminthosprium oryzae* in Anambra State. The disease incidence was highest in Omor followed by Otuocha while the least was recorded in Anaku. The result also showed that incidence of disease caused by *T. Padwickii* in Ebonyi State was significantly higher in Abakaliki. This is followed by Isiagu in Ivo LGA while the least was recorded in Izzi Local Government Area The disease severity followed the same trend and there was no significant difference among the various

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Local government Areas. The highest severity index was observed in Ifite- Ogwari, Omor and in Izzi followed by Abakaliki while Ezza and Ivo LGAS had the least. Generally, the severity was slight in all the locations.

The incidence of disease caused by *Phoma oryzae* was highest in Nkanu east of Enugu State which was significantly higher than those recorded in other LGAs of the State. This is followed by Adani while the least was Oji River (Table 3.). The Severity showed that there was significantly higher score (2.80) in Adani than the rest of the LGAs except in Nkanu- east (2.60) while the least was recorded in Oji River Local government Area. The Severity was slight in all the location in Enugu State (Table 3.).

In Imo State the incidence of the diseases caused by *F. oxysporum* was highest in Ideato North. This is followed by Ihitte/Uboma LGA while the least was recorded in Onuimo (Table 3.). Disease incidence was comparably higher in Abia State than other states. The result also showed that disease severity in Ideato North LGA is significantly higher than other local government areas. This was followed by Ihitte/Uboma while the least was recorded in Onuimo. The disease severity was also generally higher in Imo State than other states.

Table 3. Incidence and severity of major rice diseases in different States in South Eastern Nigeria

Disease pathogen	State	LGA	Incidence (%)	Severity
F.moniliforme	Abia	Arochukwu	92.30	2.40
		Bende	75.20	2.60
		Ohafia	75.70	1.40
		Umuahia South	61.10	2.80
LSD 0.05			13.33	0.65
H.oryzae	Anambra	Anaku	48.50	1.60
		Ifite Ogwari	49.20	2.60
		Omor	57.40	2.60
		Otuocha	50..60	2.20
LSD 0.05			9.67	0.73
T.padwickii	Ebonyi	Abakiliki	37.70	2.20
		Ezza	13.09	2.00
		Isiagu	28.60	2.00
		Izzi	5.10	2.60
LSD 0.05			6.72	1.08
P. oryzae	Enugu	Adani	55.70	2.80
		Isiuzo	35.30	1.60
		Nkanu East	68.90	2.60
		OjiRiver	17.30	1.40
LSD 0.05			7.37	0.70
F. oxysporum	Imo	Ideato North	98.60	3.20
		Okata	50.20	2.40
		Ihite- Uboma	52.10	2.60
		Onuimo	48.00	2.20
LSD 0.05			10.13	0.65

Frequency of occurrence of seed borne pathogens in different rice varieties

The result of assessment of seed borne fungi associated with rice seeds across the South-Eastern states of Nigeria recorded eleven different fungal species (Table 4). They include: *Fusarium moniliforme, Fusarium solani, Fusarium oxysporum, Rhizopus sporangia, Aspegillus spp, Penicillum spp, Helminthosporium oryzae, Trichoconis padwickii, Phoma oryzae, Botridiploidia spp and Curvularia oryzae*. *F. moniliforme* occured most being isolated from twelve rice varieties out of the thirteen studied. This was followed by *Aspergillus oryzae* and *Penicilium oryzae* which were isolated from seven different rice varieties out of the thirteen investigated (Table 4.). The third were *F. solani* and *T. padwickii* which occurred in five different varieties of rice. The least was *C. oryzae* which was isolated from only two varieties of rice.

Table4. Frequency of occurrence of seed borne pathogens in different rice varieties

Pathogen	Rice variety	Frequency of occurrence (%)
Aspergillus oryzae	BG 90, SML, Local variety, Faro 48, Faro 44, Faro 51, Nerica.	12.07
Botridiploidia spp	Fadama, Faro 48, Faro 52.	5.17
Curvularia oryzae	BG 90, Faro 48.	3.45
F. moniliforme	Fadama, Faro48, 52,15,51,57, BG 90, SML, Local variety, Nerica, IR1416, R-Bus.	20.69
F.oxysporum	BG 90, Localvariety, Faro44, IR1416.	6.90
F.solani	Fadama, Faro48, 15,57, IR1416	8.62
H. oryzae	Local variet, Faro48, 52,51, R-Bus	8.62
Penicillium spp	Fadama, BG90, Local variety,Faro 48,51,57,IR1416	12.07
F.oryzae	Local variety,Faro 48, 15,57	6.90
T. padwickii	Fadama, BG90, Local variety, Faro48, Nerica	8.62
R. sporangia	BG90, Local variety, Faro 48, IR1416	6.90
Total		100

Fungal pathogens in rice seeds, nursery and field in different locations of South Eastern Nigeria

The pathogenic organisms associated with rice seeds, rice seedlings and crops in the field are shown in Table.5. In Abia State the pathogenic organisms recorded were: *F. monliforme, P. oryzae, F.oryzae,* and *A. oryzae.* All the pathogens attack rice seeds, seedlings and rice in the field except *F.solani* and *F. moniliforme* that did not attack the seedling and rice in the field respectively.

In Anambra State the pathogenic organisms recorded include: *F. moniliforme, B. oryzae, H. oryzae, P. oscilicum* and *A. niger*. All these pathogens attack rice seeds, seedlings and crops in the field except *B oryzae* and *A.niger* which did not attack rice seedlings and crops in the field respectively In Ebonyi State the pathogenic organisms recorded were: *F. moniliforme, F. solani, T. padwickii, R sporangia, F. moniliform, A. oryzae, P. oscilicum,* and *C. oryzae.* All these pathogens attack rice seeds, seedlings and crops in the field.

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In Enugu State the pathogenic organisms recorded were: *C. oryzae.A. oryzae, F. solani* and *P oryzae.* All these pathogens attack rice seeds, and crops in the field except *F. solani P oryzae* and *A.oryzae*, which did not attack rice seedling. In Imo State the pathogenic organisms recorded were: *F. oxysporum, A.oryzae,F. moniliforme, C.oryzae, P.oscicum* and *H. oryzae*. All these pathogens attack rice seeds, seedlings and crops in the field except *H oryzae* which did not attack ice seeds and in the nursery (Table 5.).

Table 5: Fungal pathogens in rice seeds, nursery and field in different locations of South Eastern Nigeria

State	LGA	Pathogen	Seeds	Nursery	Field
Abia	Arochukwu	*F.moniliforme*	+	+	+
		Penicillium. Spp	+	+	–
	Ohafia	*F. moniliforme*	+	+	+
	Bende	*F. solani*	+	-	+
		Phoma oryzae	+	+	+
	Umuahia South	*A.oryzae*	+	+	+
		F. moniliforme	+	+	+
Anambra	Omor	*Botridploidia spp*	+	-	+
		H. oryzae	+	-	-
		P.oscilicum	+	+	+
		A.niger	+	+	-
	Ifite Ogwari	*H.oryzae*	+	+	+
	Anaku	*P.oscilicum*	+	+	-
	Otuocha	*B.oryzae*	+	-	+
Ebonyi	Izzi	*F.moniliforme*	+	+	+
	Ezza	*F.solani*	+	+	+
	Abakiliki	*T.padwickii*	+	+	+
	Isiagu	*R.sporangia*	+	+	+
Enugu	Adani	*F.moniliforme*	+	+	+
		A.oryzae	+	+	+
		P.oscilicum	+	+	+
		C.oryzae	+	+	+
	Isiuzo	*C.oryzae*	+	+	+
		A.oryzae	+	+	+
		F.solani	+	-	+
	Nkanu East	*P.oryzae*	+	-	+
	OjiRiver	*A.oryzae*	+	-	+
Imo	Ideato North	*F.oxysporum*	+	+	+
		A.oryzae	+	+	+
		F.moniliforme	+	+	+
		C.oryzae	+	+	+
	Okata	*F.moniliforme*	+	+	+
		A.oryzae	+	+	+
		P.oscicum	+	+	+

Ihite/Uboma	*F.oxysporum*	+	+	+
	F.moniliforme	+	+	+
Onuimo	*H.oryzae*	_	_	+

+ = Present, - = Absent

DISCUSSION

Disease distribution showed that the highest disease occurrence was False smut (31.09%) followed by leaf rot (28.76) (Table.1). Blast with value of 12.43%, though of low incidence that year is a very devastating disease of rice in South- eastern Nigeria as was reported by the farmers in Abakaliki of Ebonyi state and Uzouwani in Enugu state. It was observed to be the third highest disease incidence in South-eastern. The farmers reported that when this disease occur, that it is always overwhelming and leaving so many farmers in penury and sometimes some of them taking their lives as a result of debt burden from the loans they borrowed either from money lenders or banks. This report is in agreement with the findings of Imolehin, (1983) who reported high incidence of brown leaf spot in most rice fields in Nigeria caused by *Helmenthosporium oryzae*. According to him, the same organism causes reduced seed germination and reduced rice yield in Nigeria due to high prevalence of grain rot. The result is also consistent with the report of Utobo *et al*. (2011*),* who found that *Helminthosporium oryzae* was the second most isolated fungus in Abakaliki of South-eastern Nigeria. They also reported that this same organism has been shown to reduce seed germination and consequently reduce rice yield in Nigeria. Imolehin (1983), also reported that *Pyriculara oryzae* was not isolated from any of the rice cultivars. The same report was given by Utobo *et al*. (2011), who found that in a survey studied in Abakaliki of Ebonyi state *P. oryzae* was only isolated from three varieties (FARO 44, IR-8 and BG-12) out of eleven varieties tested. Aluko (1969) also reported that 81% of rice grain samples tested were infested with *H. oryzae* compared with 8.4% infected by *Pyricularia oryzae*.

The result of survey of incidence and severity of major fungal diseases of rice in different local government areas of the states showed that, there were varied fungal pathogens prevalent in various States and Local Government Areas. This result is similar to the report of other researchers, Imolehin, (1983), Utobo *et al.* (2011), Suleiman and Akaajime, (2010) Ibiam *et al.* (2000) and Butt *et.al*. (2011), who reported that there were several fungal pathogens attacking rice plants at various areas in the same State or LGA. They reported that different fungal pathogens attack rice plants and seeds in the field and store at different locations of a given State or LGA. Ibiam, *et al*. (2008) reported that *Fusarium moniliforme, Bipolaris oryzae, Fusarium oxysporum, Aspergillus niger, Aspergillus flavas, Aspergillus terreus, Alternatria terruis and Penicillin sp* were isolated and identified from seeds of three varieties of rice (Faro 12, Faro 15 and Faro 29) in storage, and *Fusarium oxysporum, Chactomium globosum, Curvularia lunata and Trichoderma harzianum* from the seeds of three rice varieties from the field in Afikpo while Utobo *et al.* (2011) isolated and identified: *Rhizopus oryzae, Trichoconis padwickii, Helminthosporium oryzae, Fusarium moniliforme, Aspergillus niger, Curvularia lunata, Penicillium spp, Alternaria oryzae, Pyricularia oryzae* from rice seeds from various locations in Abakaliki. They also reported that among the isolated fungal pathogens, there were one or more of them that were most predominant as were observed in

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this study. This is also in accordance with Iwuagwu *et al* (2014), who in their study on Identification and control of mycopathogens associated with storage of five horticultural produce in evaporative coolant-vegetable basket, reported the isolation of *Aspergillus* niger, *Fusarium moniliforme, Cladosporium fulvum* and *Helminthosporium spp* from some stored fruit and leafy vegetables. Utobo *et al.* (2011) reported that among the fungal pathogens isolated, *Trichoconis padwickii* was the most predominant. Ibiam, *et al.* (2000), also reported that *Fusarium moniliforme* was more prevalent than other fungi both in the field and storage in Afikpo- North Local Government Area. Imolehin (1983) also reported that *Helmimthosporium oryzae* was the most frequently isolated seed borne fungus regardless of the source of rice cultivars tested in Edo State.

It was also observed in this study that there was significant difference in incidence and severity of a particular disease caused by same fungal pathogen in different local government areas of each state. The reason could have been due to differences in crop management as observed in the different areas studied. According to Diaz, *et al.* (1994) the biophysical factors, source of irrigation, weed and pest pressure are significant determinants in disease incidence and severity and consequently on yield as was obtained in this study.

CONCLUSION

Incidence and severity of rice diseases was as high as 98.60% and 3.20 respectively in some of the areas sampled. The most important disease recorded was seed rot caused by *Fusarium moniliforme*. *Fusarium moniliforme* was the most frequently occurring fungus of all the fungal isolates belonging to nine genera. This research has succeeded in pulling together the fungal pathogens associated with rice plants in the zone in such a way that one could see at one glance. This study can now enable investors, the government and researchers to manage challenge posed by disease infestation in the areas.

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