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OCCURRENCE OF WOOD-AND ROOT- ROT BASIDIOMYCETES ON TREES IN BAYERO UNIVERSITY, KANO, NIGERIA

[1]Kutama*, A. S., [2]Saratu, A.O. and [3]Asma'u, A. U.
[1]Department of Plant Science, Bayero University, Kano - Nigeria
[2]Department of Science Laboratory Technology, Kano State Polytechnic, Kano - Nigeria
[3]Department of Biology, Federal college of Education, Kano - Nigeria
*Correspondence author: kutamasak@yahoo.com

ABSTRACT
Several death and decays or rots of tropical trees are as result of infection caused by wood and root rot 'parasitic basidiomycetes. In the present study, survey of parasitic homobasidiomycetes causing wood and root rot on woody trees in Bayero University, Kano (two campuses) was carried out between April – September, 2011. The survey was conducted in two phases, to determine the occurrence of wood and root-rot parasitic fungi on the trees and the level/extent of damage done by the parasites. Results on the distribution and relative abundances of these wood and root-rot causing parasitic basidiomycetes have indicated the presence of two predominant species: Ganoderma phillipii and Phellinus noxious on the trees found on the two campuses with Ganoderma phillipii being the most occurring (40 and 15 isolates from old and new campus, respectively) while Phellinus noxious was the least (31 and 17 isolates from old and new campus, respectively). These parasitic basidiomyecetes were found affecting and causing damages on Azadirachta indica (neem tree) and Parkia biglobosa (parkia) trees. A total of 22 trees (seven and 15 in the old and new campus, respectively) were found dead due to serious infection by the parasites. This situation if left unchecked may grow and become a more serious threat to the trees on the two campuses. Effort should be made to eliminate these fungi before they kill more of the trees on the two campuses considering the importance of trees to mankind.
Keywords: Basidiomycetes, woody trees, Bayero University, wood and root rot

INTRODUCTION

The basidiomycetes comprise of an assemblage of the most advanced group of fungi whose members include the popular mushroom, Toadstools, Puffballs, bracket (shelf) fungi, rusts, and smuts (Mehrotra and Aggarwal, 2003; Kutama, 2011). They reproduce sexually by means of exogenously produced basiodiospores (Hood. 2003, 2006). Basidiomycetes belong to the phylum division basidiomycota, with about 31, 515 species from 1, 589 genera (Hood, 2003). The division was traditionally divided into two old classes, namely; homobasidiomycetes (comprising of mushrooms, and bracket fungi) and heterobasidiomycetes (including jelly fungi, rusts and smuts) (Tarr, 1962; Moore, 2006; Norman *et al*., 2008). Basidiomycetes are mostly saprophytic, surviving on decayed organic substrates but very few are obligate parasites. Of the two classes of basidiomycetes mentioned, the homobasidiomycetes cause important tree diseases in the tropical world. Example of parasitic species of homobasidiomycetes belongs to two important genera: *Ganoderma* and *Phellinus noxious*. *Ganoderma* is a genus of polyspores which grow on woody tree (Hood, 2006). These parasitic basidiomycetes cause decomposition of wood resulting into a whitish coloration of the dead wood popularly known as white rot. Wood and root rot basidiomycetes are occasional problem in desert plants including cliff rose, Canotia (*Canotia holacantha*) e.t.c (P.D.P, 2011). Also cacti which have a large amount of solid wood tissues may be invaded and decayed by wood rotting basidiomycetes (Uno *et al.*, 2008).

Trees are a very important natural component of the environment that help to produce and re-cycle fresh air, provide habitat and food for man, animals and plants. Trees also provide an anitidote against erosion. They are sources of so many important medicaments. Perhaps, the importance of trees can not be over emphasized. Because of the innumerable economic importance of trees to humanity, their conservation of at least protection is of paramount importance to mankind. However, many death and decays of tropical trees and due to infection by several species of wood and root - rot basidiomycetes. There is the apparent need to conserve these trees. So many governmental as well as voluntary organizations are advocating for the conservation of our trees as well as re-planting them where necessary. This call for the need to continuously make up-date on the occurrence of any factor that might lead to the destruction of these valuable natural gifts, the trees. The aim of this study was to investigate for the occurrence of wood and root-rot causing basidiomycetes on trees in two campuses of Bayero University, Kano.

MATERIALS AND METHODS

Study site

The study was carried out in the old and new campuses of Bayero University, Kano located on the co-ordinates; latitude 12° 04' N, longitude 7° 32' and on an average elevation of 573.3m above sea level. The University campuses are located in the Sudan savanna region of Nigeria.

Field survey and sample collection

The survey was done between April to September, 2011 in two phases; first and second phase. During the first phase, only infected trees or trees bearing the sporophore fruiting body of the parasitic fungi were inspected, identified and marked. The specific locations of such trees, their number as well as the level of damage on the trees were also noted. Samples of the fungi were obtained using sharp, strong and sterilized blade or knife from the site of infection; trunk or root base (Steyaert, 1967). Each sample was labeled and packed in a sterilized polythene bag and quickly taken to the laboratory for identification. During the second phase, other trees on the two campuses were surveyed to identify the tree species, location, presence or absence of any fungal growth and symptom of infection. Trees around the school premises and staff quarters were both surveyed. A total of 618 trees were surveyed in the first and second phase of the survey on both campuses.

Method of identification

The various samples of the parasitic basidiomycetes collected during the survey were identified in the laboratory based on macroscopic features as described by Uno *et al.* (2008) and Corner (2001). Macroscopically, *Ganoderma* sp has a fruiting body with a broadly attached, wood shelf, smooth, semi glossy in part, colored dark reddish or purplish brown with fine pores, 4 – 7 per millimeter. On the other hand, *Phellinus noxious* has a fruiting body with a brown, broadly attached woody shelf developing blackish crust on the upper surface, grayish to dark brown fine pores 6 – 8 per millimeter (Hood,2003; 2006; Old *et al*., 2000; Galdigil *et al*., 2005),

Data analysis

Paired t- test was adopted to statistical compare the distribution of the various parasitic basidiomycetes on the two campuses of Bayero University, Kano.

RESULTS AND DISCUSSION

The distribution and relative abundances of various parasitic basidomycetes on woody trees in the two campuses of Bayero University is shown in Table 1. A total of 103 parasitic basidiomycetes were obtained during the survey. In the old campus, 71 isolates were identified out of which 40 belongs to *Ganoderma phillipii* while 32 were *Phellinus noxious* (Figure 1). However, in the new campus, only 32 isolates were obtained, despite the larger number of the trees on campus (Table 2), out of which 17 belong to *Phellinus noxious* and fifteen isolates were *Ganoderma phillipii*. This indicates that there were more parasitic basidiomycetes on B.U.K old campus trees than on new campus trees. T-test at 5% probability level indicates a significant difference ($P \leq 0.05$) between the two sites. The large number of parasitic basidiomycetes from old campus trees might be due to two reasons; firstly, most of the trees in the old campus are older than those of the new campus, and secondly, due to narrow size of the old campus, trees are being cut or occasionally wounded. Uno *et al.* al. (2008) reported that in living trees and shrubs, most rotting caused by parasitic basidiomycetes are confined to the older central wood of stems and branches. They added that the conks of these fungi appear near the infection sites. Nunez and Ryvarden (2005) explained that the shelf – shaped fungal structures of parasitic basidiomycetes are commonly seen along the main trunk and on infected branches. The fungus enters through wound and the disease progresses slowly and is generally not noticed until the fungus has destroyed the heart wood. The number of infected tree plants in the two campuses also differs. Table 2 shows the distribution of the various tree plants affected by the parasitic basidiomycetes. In both campuses, three plant species appeared to be the predominant trees; *Azadirachta indica* (Neem), *Parkia biglobosa* (parkia) and *Mangifera indica* (Mango). In the old campus, sixty one, 10 and zero isolates of parasitic basidiomycetes were found on Neem, parkia, and Mango tress, respectively, while in the new campus, 25, six and one isolates of parasitic basidiomycetes were recovered on Neem, parkia, and Mango trees, respectively. The results has clearly shown that in both old and new campus neem and parkia trees were having the largest number of wood and root rot causing fungi while mango was having the least. However, despite their number, the level of damage done by the parasites (Table 3) was relatively insignificant but may be progressive with time. This was probably because the parasitic basidiomycetes find it relatively hard to attack and decompose the trees because the trees possess hard body and bark making it tough for parasitic fungi to cause considerable damage (Corner, 2001). Some parasitic fungi such as *Ganoderma* sp were therefore confined to roots (Figure 2), thereby causing root rot. The two species of parasitic basidiomycetes recovered during the study period are the most common causes of wood and root rot in woody trees of the savanna and semi-desert vegetation of the world. However, the numbers of these parasitic fungi on woody trees were relatively low or small considering the tree population on the two campuses. The presence of these parasitic basidiomycetes might be due to the dispersal of spores from affected plant to healthy wounded plants. However, it is worth noting that wood and root rot basidiomycetes can gradually reduce the tree population of any ecological system or niche. Mohammed *et al*. (2007) showed that many basidiomycetes serve as important ecological role as wood decomposers as a result of which they causes reduction in the timber yield of most savanna and desert trees. Wood – rotting basidiomycetes are common disease fungi in a large number of

conifers, deciduous trees, shrubs and hardwoods throughout the forest areas of Arizona. Large losses of timber on living and harvested trees are caused annually by theses fungi (P.D.P., 2011; Uno *et* al., 2008; Zoberi, 1972). Therefore, wood rotting basidiomycetes are a threat to the savanna tree vegetation and, as a consequence, a threat to the ecological balance. Therefore, if these parasitic basidiomycetes are left unchecked, they may proliferate and become a big problem that may result into reduction in the number of trees in this region.

Table 1: Distribution and Relative Abundances of wood rot parasitic Homobasidiomycetes on Woody trees in Bayero University, Kano

Location	Name of parasitic Basidiomycetes	Number of occurrence	Relative abundance (%)
BUK old campus	*Ganoderma phillipii*		38.8
	Phellinus noxious	31	30.1
	Sub-total	71	68.9
BUK new campus	*Ganoderma phillipii*	15	14.6
	Phellinus noxious	17	16.5
	Sub total	32	31.1
Total		103	100.00
Mean		25.75	
t-calculated		3.27	
T-table (P ≤0.05)		2.13	

Table 2: Number and distribution of tree plant species and parasitic basidiomycetes obtained on the trees

Location	Tree Plant species	Number of occurrence	Number of Parasitic Basidiomycetes Obtained from trees:
BUK old campus	Azadirachta indica	220	61
	Parkia biglobosa	15	10
	Mangifera indica	03	00
	Acacia nilotica	02	00
	Sub- total	240	71
BUK new campus	Azadirachta indica	280	25
	Parkia biglobosa	94	06
	Mangifera indica	04	01
	Sub-total	378	32
Total		618	103

Table 3: Extent of damage by parasitic basidiomycetes on woody trees in Bayero University, Kano

Location	Tree plant	No. of tree plant		Extent of damage done on tree plant by parasitic Basidiomycetes		
BUK old campus	Neem	220	04	00	10	206
	Parkia	15	03	00	10	02
	Mango	03	00	00	00	03
	Acacia	02	00	00	00	02
	Sub- total	240	07	00	20	213
BUK new campus	Neem	280	05	00	15	260
	Parkia	94	10	00	10	74
	Mango	04	00	00	00	04
	Sub - total	378	15	00	25	338
Total	618	22	00	45	551	

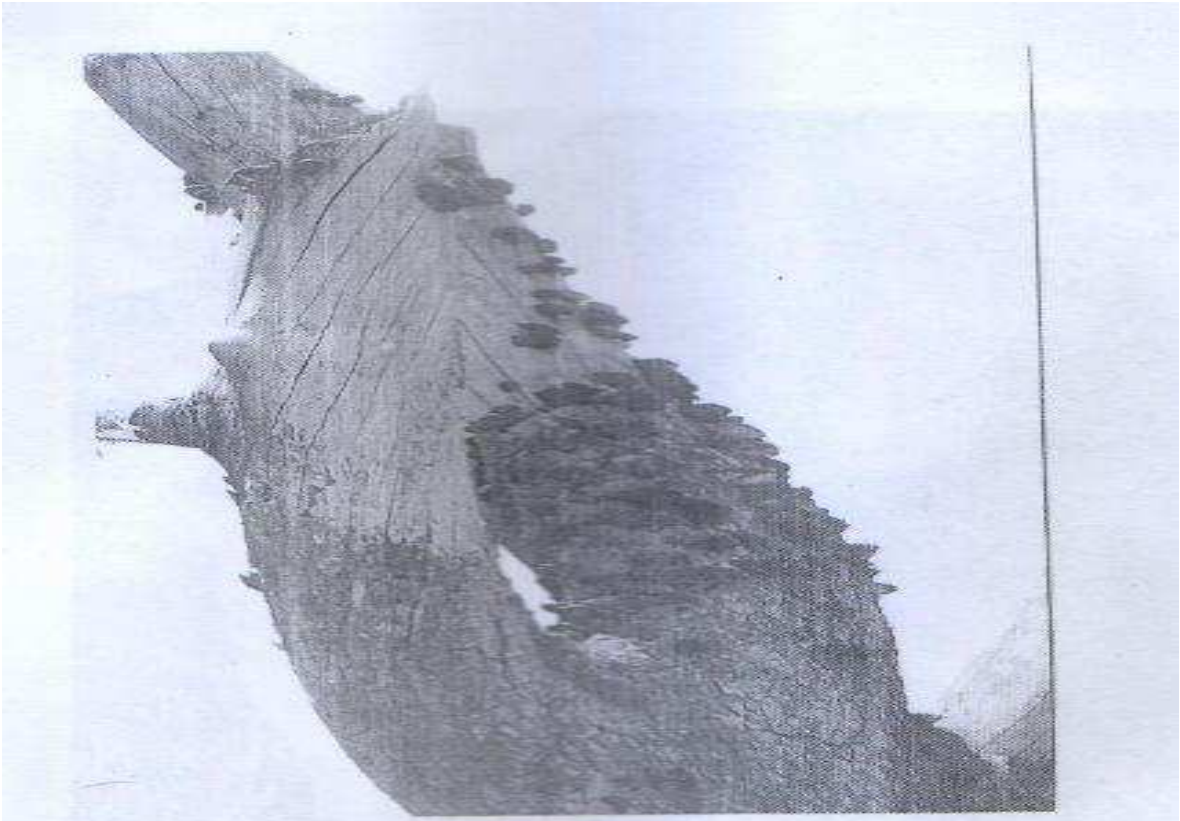

Figure 1. Wood rot causing *Phellinus noxious* on *Acacia nilotica* tree

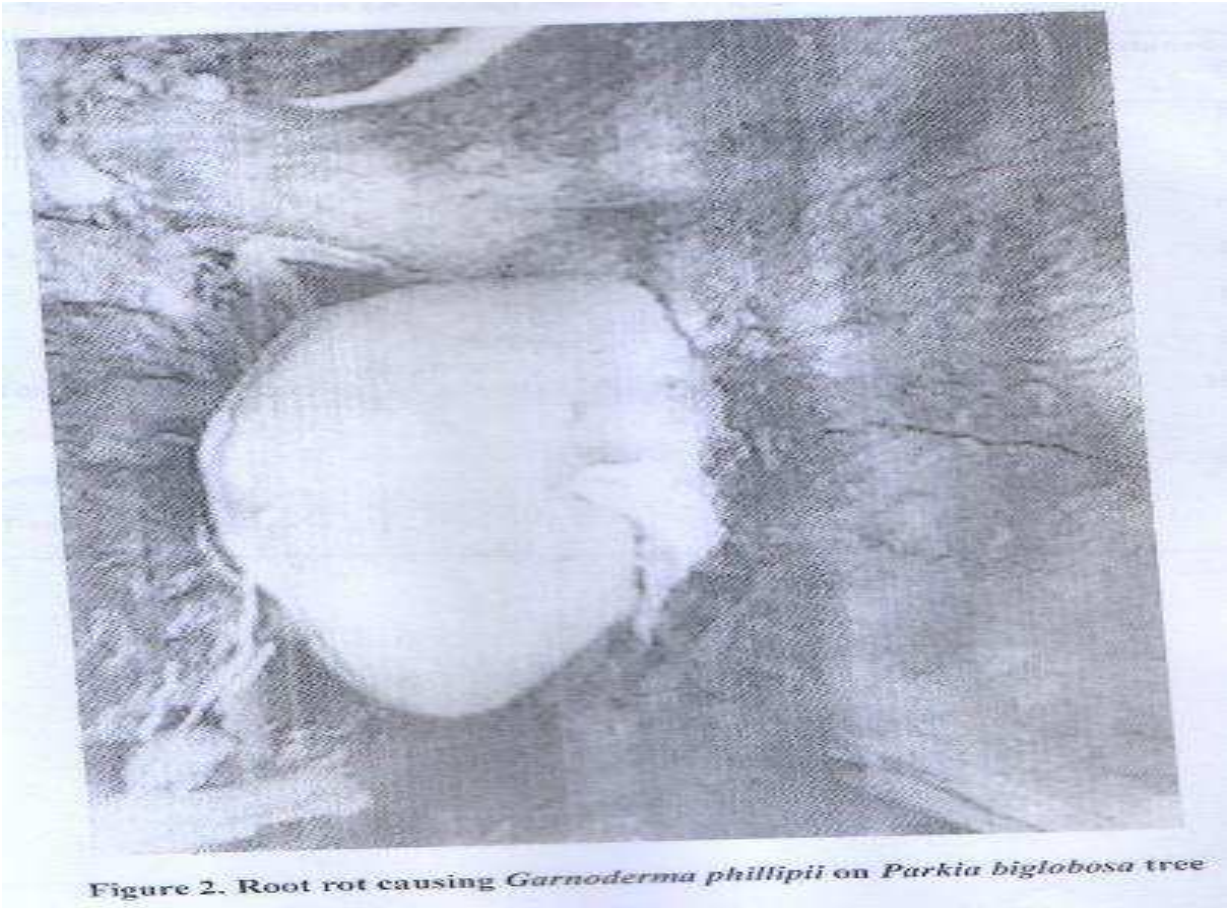

Figure 2. Root rot causing *Garnoderma phillipii* on *Parkia biglobosa* tree

CONCLUSION

Parasitic basidiomycetas were responsible for the death of some trees on the campuses of Bayero University, Kano. Therefore, effort should be made to stop these wood and root rot basidiomycetes from further killing more of these healthy trees, considering the importance of tress to humanity in general.

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