

## Impact of weaver birds (*Ploceus cucullatus* Muller) nesting on the ornamental trees shade management in the University of Port Harcourt, Nigeria

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**Abstract:** A survey within the University of Port Harcourt, Nigeria indicated that weaver birds are the most damaging avian pests to ornamental trees. Though, the presence of this species among other birds has been reported but their damaging activities on tree shade management is lacking. Therefore, the impact of weaver birds nesting on the ornamental trees shade management in the University of Port Harcourt was investigated in the three campuses using on-site surveys and observations. A total of 116 trees of 7 species belonging to 5 families were used by *Ploceus cucullatus* for their nesting activities. From the utilization standpoint, two classes of species were recognized: nest building material species (NBMS) and nest building supporting species (NBSS). Survey indicated that 102 trees or 87.93% were NBMS with Arecaceae family dominating while 14 trees or 12.07% were NBSS with Anacardiaceae family dominating. The result demonstrated that weaver birds nesting activities were distinctly more damaging on NBMS than NBSS, and strongly associated with massive defoliation of NBMS. Consequently, NBMS were remarkably inflicted resulting in poor shade provision and management. It can be inferred that the cardinal goal of shade production of NBMS was defeated. This study therefore, recommended non-utilization of these highly susceptible species to weaver birds for landscaping within the Universities in Niger Delta region.

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### 1. Introduction

While weaver birds have affinity for riverine and wetland environments in Nigeria, indigenously, indicator of quality environment and suitability of stream water for human consumption have been acknowledged by the presence of this species. Globally, literatures are replete of the significant roles of birds to effective monitoring and management of coastal and marine ecosystems (Croonquist and Brooks, 1991; Hawksworth, 1995; WRI, 1996; Canterbury *et al.* 2000; Sekercioglu, 2006; Surya and Manasvini, 2013). Nest building is species specific in birds. What is common to birds is that they all sleep; many sleep at night and few like bat and owl sleep during the day. However, many roost by perching on preferred trees' branches, few like wood peckers build nests (cavity) in woods and few like weaver birds build nests with vegetative materials on trees. Therefore, in strict terms nesting and roosting are not synonymous as the former requires damaging of tree parts while the latter has little impact on devaluation of trees parts.

Shade production is one of the cardinal goals of ornamental trees management across the globe, and its varying steam of functions can be hindered by many factors. In order to increase and sustain the contribution of ornamental trees to the social and

environmental developments, it is necessary to protect and maintain the shade of the trees for posterity benefits. Though, it is well acknowledge that any factor that hinders the root chemistry system is an ultimate killer of trees but massive destruction of canopy system may also result in quick or slow decline of trees due to starvation. Woody trees are integral component of institutional landscaping in Nigeria. Apart from their aesthetic value, and soil conservation functions, they are also being managed for cooling effect of their shades. However, their cooling effect function is usually hindered by organisms that directly or indirectly reduce their leaves or crown density.

Trees provide many environmental services including life support functions such as sequestration of Carbon IV Oxide thus mitigating island heat effect; therefore its loss implies significant consequences to humanity. One major constrain of trees in Nigerian University settings is the continuous decline of species because of pests' infestations. Trees component of landscaping in most part of Nigeria usually suffer neglect unlike shrubs and grasses. Weaver birds are notable social residential birds in Nigeria. Just as the name implies, weaver birds predominantly weave their nests in social arrangement using fibrous long leaves. Weaver birds consume a large number of leaves,

causing direct impact on shade management. Considering the impact of massive defoliation on the present and likelihood future delivery of environmental services of these trees in the University of Port Harcourt (UNIPORT), it is necessary to provide better information about sustainable use of shade trees, and realization of the information to address the driver(s) of shade degradation. UNIPORT is geographically favoured with luxuriant natural and/or managed vegetations. But in recent times, weaver birds devastating pest situation has been observed on a large numbers of shade providing trees within the three campuses of the university. Few pest situation studies of weaver birds in Nigeria were concentrated towards cereal; mainly rice production (Funmilayo and Akande, 1974; Bright, 1988; Bright and Ogunyemi, 2000; Bright, 2004; Bright *et al.* 2009). The abundance of weaver birds has also been reported in UNIPORT (Ijeomah *et al.* 2013), however, no research has linked the presence of this avian species to massive defoliation of ornamental trees. Therefore, this study was initiated to provide useful information for realization of sustainable shade management for the benefit of present generation and posterity in the Niger Delta region and Nigeria at large.

## 2. Materials and Methods

### 2.1 The study area and data collection

The study was carried out in the three campuses: Choba (Latitude 4° 53' 30'' and 4° 53' 55''N and

Longitude 6° 54' 20'' and 6° 54' 45''E), Delta (Latitude 4° 53' 55'' and 4° 54' 15''N and Longitude 6° 54' 00'' and 6° 54' 25''E), and Abuja (Latitude 4° 53' 25'' and 4° 54' 35''N and Longitude 6° 54' 25'' and 6° 55' 55''E) of UNIPORT. The university falls within humid region characterized with two seasons, the dry season (November to March) and wet season (April to October). The rainfall distribution is nearly all year round though its intensity is seasonal and variable. The monthly mean maximum temperature ranges from 28°C to 33°C while the monthly minimum temperature ranges from 17°C to 24°C (Ogbonna *et al.* 2007). Prevailing weather conditions among other factors appeared to be relatively favourable for the abundance of weaver birds among avian species in the region.

The survey covered the activities of weaver birds on ornamental trees. The activities of the birds on the ornamental trees were used to classify the affected species into two: (a) nest building material species (NBMS) and (b) nest building supporting species (NBSS).

## 3. Results

### 3.1 Species utilized

A total of 116 trees of 7 species belonging to 5 families were found to be utilized in the three campuses by weaver birds as presented in Tables 1. Highest numbers of trees were utilized in Abuja followed by Delta and Choba Campus.

**Table 1: Frequency of ornamental trees utilized by weaver birds in UNIPORT.**

Abuja Campus				
S/N	Scientific names	Family	Frequency	Relative frequency (%)
1	<i>Cocos nucifera</i> *	Arecaceae	15	12.93
2	<i>Elaeis guineensis</i> *	Arecaceae	68	58.62
3	<i>Mangifera indica</i>	Anacardiaceae	8	6.90
4	<i>Polyalthia longifolia</i> *	Annonaceae	4	3.45
5	<i>Roystonea regia</i> *	Arecaceae	14	12.07
Sub total			109	93.97
Delta Campus				
1	<i>Casuarina equisetifolia</i>	Casuarinaceae	3	2.59
2	<i>Mangifera indica</i>	Anacardiaceae	1	0.86
Sub total			4	3.45
Choba Campus				
1	<i>Elaeis guineensis</i> *	Arecaceae	1	0.86
2	<i>Eucalyptus camaldulensis</i>	Myrtaceae	2	1.72
Sub total			3	2.58
Total			116	100

\*Nest building material species (NBMS)

**3.2 Impact of nesting on shade management**

Impact of weaver birds nesting was reflected in the total numbers of trees species utilized but much

immediate impact was observed in NBMS as indicated in Table 2, Figs 1 and 2

**Table 2: Classification and frequency of ornamental trees species utilized by weaver birds**

S/N	Classification	Frequency	Relative frequency
1	Nest building material species (NBMS)	102	87.93
2	Nest building supporting species (NBSS)	14	12.07
<b>Total</b>		<b>116</b>	<b>100</b>



Fig. 1: Rows of *Elaeis guineensis* (NBMS) on basic studies road completely defoliated in Abuja Campus



Fig. 3: Nests on *Mangifera indica* in Abuja Campus



Fig. 2: *Polyalthia longifolia* (NBMS) completely defoliated in Abuja Campus



Fig. 4: Nests on *Casuarina equisetifolia* (NBSS) in Delta Campus





Fig. 5: Nests on *Eucalyptus camaldulensis* (NBSS) in Choba Campus



Fig. 8: Row of old *Terminalia catappa* providing varying stream of services for varying items in Choba Campus



Fig. 6: Non avian pests attractive *Chrysophyllum albidum* in Abuja Campus



Fig. 9: Non avian pests' attractive *Ficus elastica* in Abuja Campus



Fig. 7: Non avian pests attractive *Terminalia catappa* providing cooling services for students in Choba Campus

#### 4. Discussion

The use of trees in landscaping system is a necessity in University settings, primarily to provide many environmental services including life support functions such as sequestration of Carbon (IV) Oxide thus mitigating island heat effect. Harsh weather conditions being experienced recently by people in the University environment should serve to reinforce conservation of more shade providing trees. Human beings and their properties are benefitting immensely under trees' shades, as few shade providing species (Figs. 6-9) are ameliorating the effects of the heat-loading during the daytime in the University. The university is experiencing seemingly increasing pest situation of weaver birds on ornamental tree shade and knowing the shade importance of different trees and their associated pests in a peculiar ecological zone is such a good guide to ensuring sustainable shade management. The two classes of species (NBMS and

NBSS) had different distinct functions to weaver birds. NBMS were relatively more utilized than NBSS. This was due to the much materials required from NBMS for the birds to weave their nests in a social family arrangement on NBSS (Figs. 3-5). This result was in congruity with those previously reported by Ijeomah *et al.* (2013) that the few times Village weavers were sighted on *Elaeis guineensis*, were when they were either feeding on insects or collecting foliage from it to build their nests on *Mangifera indica*. In addition, weaver birds equally visited the leaf of *Musa spp* to complement NBMS. Weaver birds showed special preference for Arecaceae and Annonaceae families as NBMS. This was probably because of the lengthy size of their leaves. More so, higher preference of Arecaceae over Annonaceae was likely as a result of fibrous nature of Arecaceae leaves which can withstand longer weathering effect without being disintegrated unlike Annonaceae which is friable even under wet or green conditions. Therefore, leaf length and its fibrous nature appeared to be principal characteristics considered by weaver birds in nests construction.

The birds exhibited varying preferences for NBSS in the three campuses. *Mangifera indica* was the preferred species in Abuja campus, *Casuarina equisetifolia* and *Mangifera indica* in Delta and *Eucalyptus camaldulensis* in Choba. This showed that weaver birds had capacity to choose varying range of trees species as nesting sites. Though, it was evident that weaver birds preferred dying *Casuarina equisetifolia* and *Eucalyptus camaldulensis* in Delta and Choba Campus respectively but the *Mangifera indica* species too showed some elements of canopy degrading characteristics. This could be a thermoregulation strategy. Weaver birds are notably known as residential birds. For both NBMS and NBSS, Abuja remarkably hosted most weaver birds followed by Delta and Choba. Abundance and availability of preferred species was one factor on one hand, and perhaps, human population seemed to be another influencing factor on the other hand. More so, availability of preferred species in adjoining communities could be attributed to low hosting of birds in Delta and Choba. Adjoining communities in Choba axis especially Ozuoba zone hosted large numbers of weaver birds families on different trees species notably *Gmelina arborea*. Appreciable numbers of similar NBMS were seen completely defoliated by weaver birds along Ozuoba road. The strategic locations of weaver birds' nests sites in the three campuses were closer to where human population was dense and noisy. This could be a survival strategy to have access to human foods especially rice or they have affinity for human voices. Rice is a known food for weaver birds but the birds

have been spotted feeding on *Terminalia catappa*, *Calliandra portoricensis* fruits and flowers, and *Chrysophyllum albidum* flowers very early in the morning around 6.00am and late in the day around 6.30 to 7.00pm. Though, Ijeomah *et al.* (2013) asserted that Choba campus, despite its relatively lesser landmass and noisy nature recorded the highest number of birds because of its closeness to the residential areas of Choba community; it is most likely that most birds migrating from Ozuoba and nearby areas have no closer open space with trees to nest and feed apart from Choba campus.

The impacts of weaver birds on the two classes of trees species varied greatly. The birds inflicted a considerable damage on the NBMS leaf thus rendering the trees shade-less. On the other hand, the birds did not inflict any immediate serious damage on the NBSS leaf except for fear that many humans may not eventually use the trees shade because of the possibility of being stained by birds' droppings. This result was largely due to the utilization of NBMS for building or constructing nests. Abuja campus revealed higher leaf bird damage than Delta and Choba campuses. This trend of damage corresponded with increase availability of preferred species in the campuses. The rate of defoliation increased with time and devastating impact is greatest in the pronounced heat months of December to March. Generally, among the NBMS leaf damaged, *Elaeis guineensis* was highest, followed by *Coconus nucifer*, *Roystonea regia* and *Polyalthia longifolia*. These trees may not easily recover and this could lead to the eventual death of the trees because of low possibility of leaf regeneration in Arecaceae family especially *Elaeis guineensis*. The possibility of leaf regeneration was not in doubt in *Polyalthia longifolia* but the extent of damage could make the plants eventually die due to pathogen inoculation from the point of defoliation and photosynthetic stress. This is similar to the assertion of Van den Berg (1998) that once the leaves and flush of a young tree have started to wilt as a result of termite damage, the subsequent control of this pest will not be able to save that specific tree. There is a likelihood that damaged or weakened trees would also become more susceptible to other degrading agent like fungi or termites that could cause fast decline of ornamental trees. It is assumed that termites might inflict more damage on unhealthy or weakened trees (Harris, 1955; Adedeji and Emerhi, 2015). The impact of weaver bird on trees shade had not been previously reported and it might be difficult to quantify ornamental trees foliage loss to birds in monetary terms, unlike rice production (Elliott and Bright, 2007).

## 5. Conclusion

This study has revealed the devastating impacts of weaver birds on sustainable shade management on some ornamental trees in UNIPORT. The persistence of foliage degradation may lead to total loss of the species (gross impacts). It was evident from the results of this study that both NBMS and NBSS species are not suitable for shade management. Considering the unquantifiable magnitude effects of heat-loading on human beings during the daytime (working-hours) in the University, massive planting of known shade important trees species that are well-adapted to the local or peculiar environmental conditions and not susceptible to weaver birds like (Figs. 6, 8, 9) is highly recommended for management as strategy to eliminate and prevent future avian pests. Quick replacement and then removal of seriously foliage damaged species including NBSS in Delta and Choba campuses with fast suitable avian resistant species is an economically feasible option.

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