DIET AND FEEDING ECOLOGY OF GREAT BLUE TURACO *CORYTHAEOLA CRISTATA* FOR SUSTAINABLE TOURISM IN URHONIGBE FOREST RESERVE EDO STATE, NIGERIA

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Abstract

This research investigated the food and foraging ecology of the Great Blue Turaco (Corythaeola cristata) in Urhonigbe forest reserve Edo state Nigeria. The aim was to know the food preference of the bird species so that they can be protected. Mature forest and secondary forest were the two land use classifications used to split the research area into divisions. Over the course of a continuous 12-month period, Data on the food and feeding ecology of 12 pairs of Great Blue Turacos with individual sizes ranging from one to three were collected (January-December 2020, The findings of the study showed that the Corythaeola cristata uses resources from 47 plant species, including fruits, flowers, and leaves, also fed on some insects as a supplement diet. Overall, about 74.68% of the birds fed on fruit, followed by 2.08% of the birds who fed on leaves and flowers, and 5.46% fed on insects Ficus latifolia, had the greatest percentage of consumption (8.04%), was followed by Musanga cecropioides (6.04%) and Dacryodes edullis (6.01%) in terms of fruit consumption by these bird species The result of the used plant species' family indicate that . Moraceae contains the most plant species of (9), followed by Euphorbiaceae (7),

Keywords: Corythaeolacristata, Conservation, Diet, Foraging Ecology, sustainable tourism

Introduction

The Great Blue Turaco (Corythaeola cristata) is the most significant turaco species and a member of the Musophagidae family of birds. It has a vast distribution in the tropical rainforest of Africa *(Holzman, Barbara 2008).* The average Blue Turaco is 70–76 cm (28–30 in) length, and weighs between 800 and 1,231 g. (1.764–2.714 lb) (*del Hoyo, Elliott, and Sargatal,2004).* Although they cannot fly well, they can move quickly on branches and through foliage and are strong climbers. On their wings, juveniles develop claws that aid in climbing. They have an exceptional foot arrangement where the fourth toe is frequently rotated such that it is either close to the second and third toes or rotated so that it practically touches the first toe.Despite its flexibility, the toe is often kept at an angle at right angles to the foot's axis (Dorn, *et al*, 2011) Dietary studies shed light on a variety of ecological features of a given species, from competition and predator-prey interactions to community composition and ecological processes in ecosystems (Fogden, 2009). The physiological, morphological, and behavioral adaptations of birds reflect the variety of feeding choices they make (Hockey, *et al*, 2015). In a bird's lifecycle, feeding is a crucial task. It is essential for his or her life, yet the stress of finding food poses serious problems for birds' physiology and behavior (Chen, and Hsieh, 2002).As a result, studying feeding ecology is crucial for comprehending how different species adapt to their habitats as well as a crucial aspect to take into account when assessing their economic position. Since Corythaeola cristata's diet and feeding ecology have not been researched in Nigeria, this research seeks to provide the background data on the food and feeding ecology that will help other professionals interested in the management of the bird.

Materials and Method

Study area

In 1935, Urhonigbe forest reserve and gazetted was established. It is located between longitudes 6o05'38" and 6o6'45"E and latitudes 5'57'59" and 5'59'31"N. The reserve, which encompasses around 30,791 hectares, is located in Edo State to the southeast of Sakponba Forest Reserve. It is situated between the settlements of Urhonigbe A and Evboesi to the East and West, respectively, and is sort of shaped like a reversed letter "C."(Isichei, 1995). The forest reserve has a 64-hectare Strict Natural Reserve (SNR); Urhonigbe lies at the southern end and Obazagbon is in the northeast. On the periphery of the forest reserve, there are more Bini towns and villages.The highest point of Urhonigbe Forest Reserve is 75 meters above sea level since the slope there is quite gradual, with a mean height of 60 meters (Mengistu, and Salami . 2007). The average annual temperature of 27 °C characterizes the world's climate as a typical humid tropical rainforest type. From March to November, there is significant yearly rainfall, with average

annual rainfall ranging from 1778 mm to 2286 mm and being evenly spread throughout the season. From December until February is the season. Sandy loam is the predominant soil type; the texture of the soil contributes to its high permeability and strong base-leaching.Due to these factors and the substantial yearly rainfall, the soil becomes very acidic, with pH values ranging from 4.30 to 5.00. Tropical rainforests make up the majority of the world's natural vegetation, which is characterized by emergent growth under many canopies and lianas. Melicia excelsa, Afzelia bipindensis, Antiaris africana, Brachystegia nigerica, Lophira alata, Lovoa trichiliodes, Terminalia ivorensis, Terminalia superba, and Triplochiton scleroxylon are a few of the most often encountered trees in the region. However, the natural vegetation of the globe has now been reduced to secondary regrowth forest thickets and fallow regrowth at various stages of development or replaced by perennial and annual crops, with the exception of places designated as forest reserves (Keay, 1989).

Data Collection

Mature forest and secondary forest were the two land use classifications used to split the research area into divisions. Over the course of a continuous 12-month period, data on the food and feeding ecology of 12 pairs of Great Blue Turacos with individual sizes ranging from one to three were collected (January-December 2020). For this study, Okosodo, et al. (2016) the Direct Observation of Okosodo *et al.* was employed. When birds were actively feeding and causing the least disturbance, dawn to dark field observations using binoculars (Bushnell 750) were employed. Individual couples were observed for intervals ranging from two to five hours. It was typically able to maintain some birds in view at all times, but it was seldom possible to see the entire group of birds at once. Observations were made on the foraging area, the type of feeding technique used, the feeding session, the number of birds, the type of meals, and any associations with other bird species during each visit. The bird's eating preferences were examined for seasonal variations. Because of the size of the trees and the height of the nests from the ground, the pellets were not investigated. Data collected from the observations were explored with descriptive statistics. The computer PAST Model version 3 was used to analyze bird species diversity.

Tables and Figures

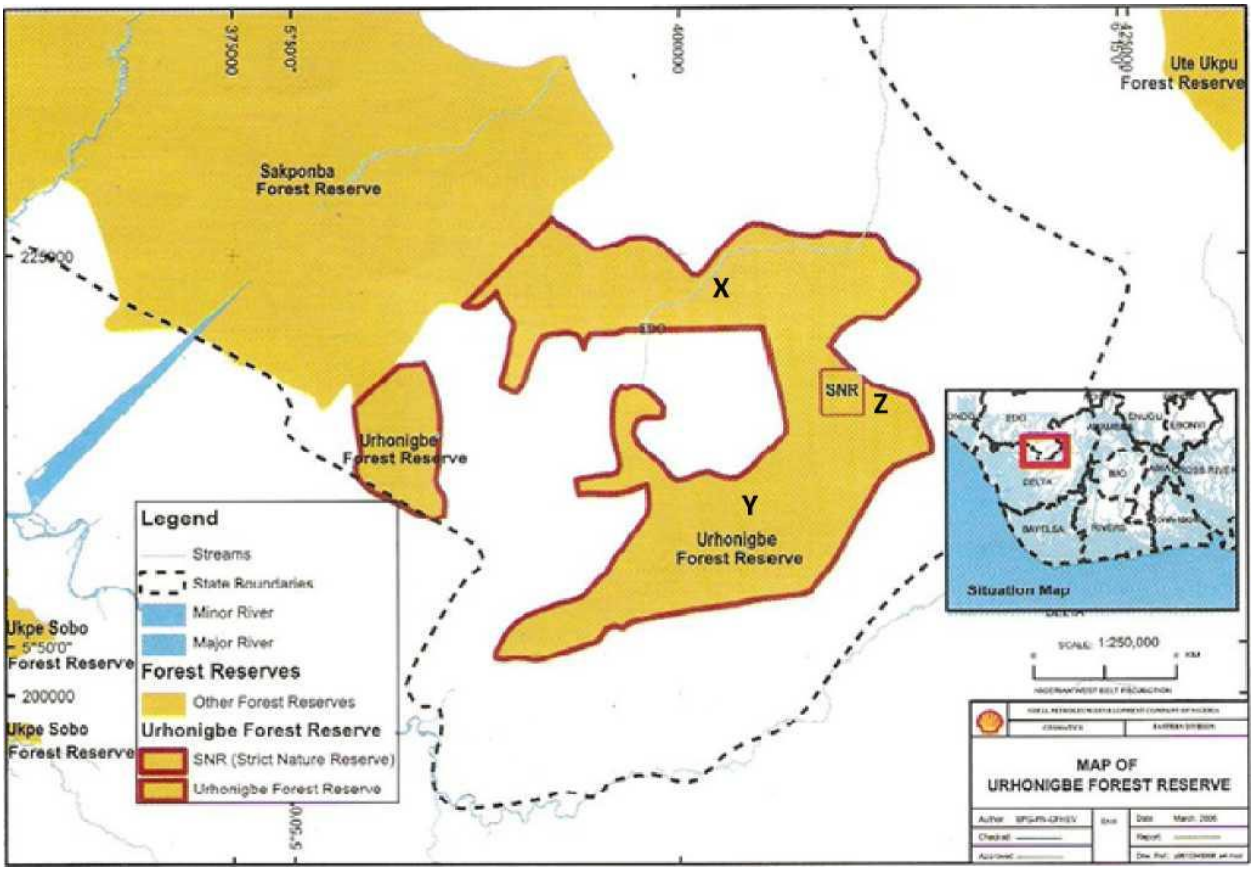

Figure 1, Map of the study area

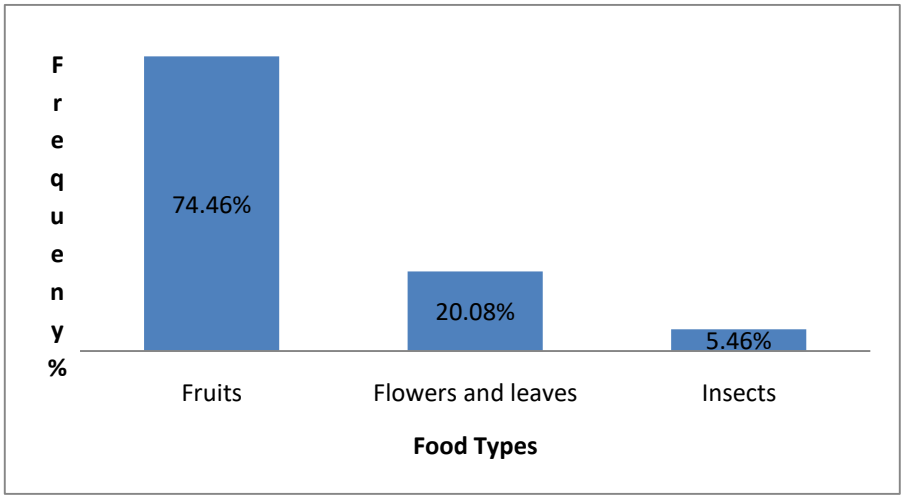

Figure 2, Food types of the Great Blue Turaco in the study area

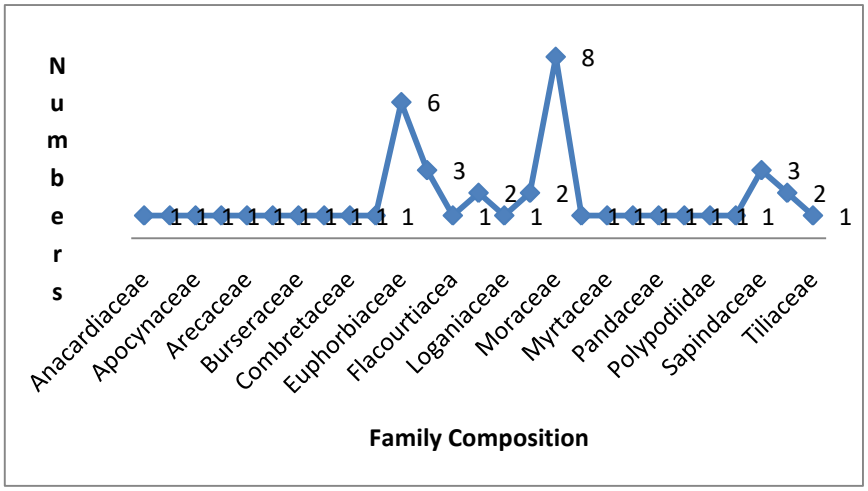

Figure 3; Family Composition of plant species consumed by Great Blue Turaco

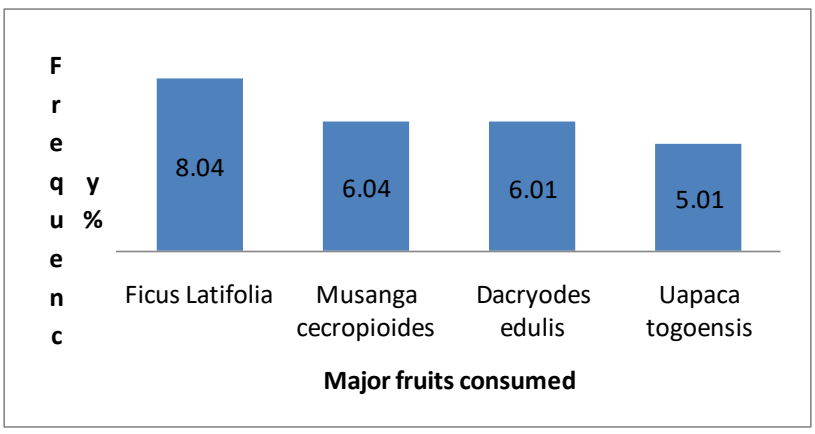

Figure 4, Major fruits consumed by great Blue Turaco in the study area

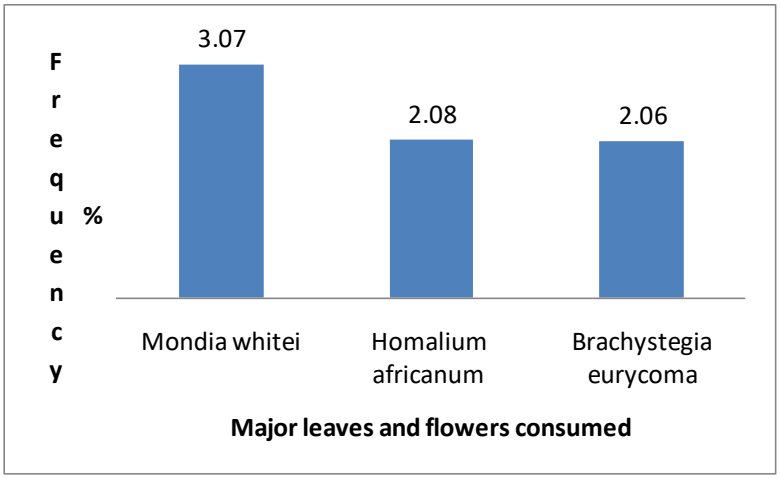

Figure 5, Major Leaves and flowers consumed by Great Blue Turaco in the study area

Habitat Utilization by Great Blue Turaco of the two compartments in the study area

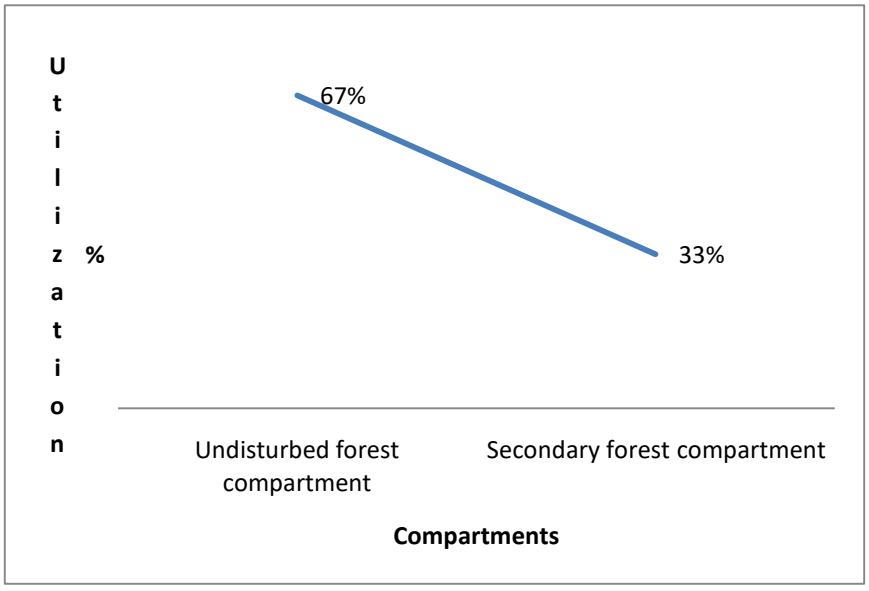

Figure 6, Habitat utilization of Great Blue Turaco in the study area

Table 1; Diversity of plant species resources consumed by Great Blue Turaco

Diversity Index	Dry season	Lower	Upper	Wet season	Lower	Upper
Taxa_S	47	41	47	43	28	37
Individuals	93	93	93	48	48	48
Dominance_D	0.02324	0.02648	0.03503	0.02691	0.03212	0.05382
Simpson_1-D	0.9768	0.965	0.9735	0.9731	0.9462	0.9679
	0.9567	0.8082	0.8992	0.9453	0.8131	0.932
Brillouin	3.192	3.001	3.132	2.842	2.523	2.749
Menhinick	4.874	4.252	4.874	6.207	4.041	5.34
Margalef	10.15	8.825	10.15	10.85	6.975	9.299
Equitability_J	0.9885	0.944	0.9721	0.9851	0.939	0.9802

Results

The findings of the result study showed that the *Corythaeola cristata* uses resources from 47 plant species, including fruits, flowers, and leaves. Also fed on some insects as a supplement diet. Overall, about 74.68% of the birds fed on fruit, followed by 2.08% of the birds who fed on leaves and flowers, and 5.46% fed on insects Figure 2. *Ficus latifolia*, had the greatest percentage of consumption (8.04%), was followed by Musanga cecropioides (6.04%) and *Dacryodes edullis* (6.01%) in terms of fruit consumption by these bird species Figure 3. The result of the used plant species' family indicate that . Moraceae contains the most plant species of (9), followed by Euphorbiaceae (7), Figure 4. Nine species of insects were observed to be consumed by the Great Blue Turaco Figure 5. The two major insects were highly consumed Macrotermes bellicosus 3.01% and Macrotermes natalensis 2.01% both of w hich belong to the family Termitidae and order Isopterea. The leaves of Mondia whitei 3.07% and Brachystegia eurycoma 2.08% were the most commonly consumed. 3. Appendix. The result of habitat utilization showed that the birds utilizes both compartments and that they utilized undisturbed compartment 67% and secondary forest 33%.Figure 6 The Simpson 1-D diversity index result revealed that there were more plant species resources accessible to bird species in the dry season (0.9768) than there were in the rainy season (0.9756) Table 1

Discussion

Our research revealed that, like the majority of frugivore species, the Corythaeola cristata consumes a range of fruits, flowers, leaves, and insects. Given that fruits in tropical forests are patchily distributed in space and time, only a small number and hence diversity of fruit patches may not be large enough to accommodate an entire foraging group or flock of frugivores at any given time, this I agreement with (Cork and Foley, 2011) report on Great Bl ue Turaco. This supports Herrera, (2014) claim from that Turacos are probably similar to other frugivores since they are generalists and can eat a range of fruit sources. They were seen to change their diet and include supplements made from insects, which is a non-seasonal behavior that depends on the availability of food supplies. These observations mostly took place during their breeding seasons, which are the wet ones. These results concur with those of (del Hoyo, Josep, et al, eds 2002) the Great Blue. Turaco mostly eats the fruits of many plant species; however it will also eat buds, shoots, leaves, flowers, and even insects. According to Mckilligan (2005), Turdus pelios are mostly insectivorous and also consume certain fruits. Their diet also includes huge insects, particularly locusts, grasshoppers, notably earthworms, millipedes, and fruits. Regardless of how they feed, according to Morse insects represent a significant source of food for birds. According to Onadeko (2011), the types of insects that are eaten often depend on the species of bird and its stage of development. Although the digestion of individual portions mostly relies on their chitin level, (Akinpelu and Oyedipe, (2004) observed that in terms of nutritional value, insect diet is adequate since it is rich in readily digested protein and fat. The diet of a group of insectivorous passerines confirmed that particular insect groups are preferred by birds, who mostly consumed Hymenoptera, Coleoptera, Orthoptera, and Diptera, leaving 36 percent, 23 percent, 12 percent, and 9 percent of insects in their excrement, respectively. Asokan (1998) discovered that the primary food sources of the bee-eater Merops oreintalis in Nagapattinan District, India, were Hymenopterans (dominated by ants) and Coleopterans (dominated by beetles).

Foraging in small flocks and congregating in large numbers at fruiting trees are frequent behaviors of *Corythaeola cristata* during the research period. Daily activities begin at 6.15 in the morning and stop at 18.00. They begin to feed at daybreak and continue to do so until nightfall, with the exception of the warmest parts of the day. Each group reaches its customary night perches at the end of the day.

Conclusion and Reconmendation

The findings of this study show that used resources that were available to them in the study region, including fruits, leaves, flowers and insects of several plant species. However, the fruits are eaten in greater quantities than insects. *Corythaeola cristata* are therefore a beneficial species for conservationist since they are majorly dispersers they help in the stability of the ecosystem and Keep the tourist out for many dangerous insects like grasshoppers, beetles, termites, caterpillars, etc. that are detrimental. They also serve to suppress insects and aid to sustain the capacity in the ecosystem. To maintain the carrying capacity of their insects in the environment, it is crucial to protect these bird species as they will help in developing sustainable tourism, On the whole, Great Blue Turacohas boththecharacteristicsofaflagshipandanumbrella species:that is itisbothacharismaticspeciesthatcould provide focus for conservation awareness and, atthe same time It has habitat requirements such that,if adequately protected, would ensure the protectionof other threatened species

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Shell Biodiversity Action Plan of Urhonigbe Forest, Edo State, Nigeria, 2006, 182 Appendix 1 checklist of plant resources consumed by Great Blue Turaco

Name of plants	Family	parts utilized
Albiza gummifera	Leguminosae	fresh pods
Albiza gummifera	Leguminosae	fresh pods
Antiaris Africana	Moraceae	Flowers
Anthonotha macrophylla	Euphorbiaceae	Leaves
Berlinia grandiflora	Sapindaceae	Flowers
Chrysophyllum abidun	Sapotaceae	Fruits
Chrysophyllum delevoyi	Sapotaceae	Fruits
Cola ginganta	Malvaceae	Fruits
Dialium guineense	Fabaceae	Fruits
Ficus latifolia	Moraceae	Fruits
Ficus capensis	Moraceae	Fruits
Ficus Esasperata	Moraceae	Fruits
Ficus glumosa	Moraceae	Fruits
Ficus thoniigii	Moraceae	Fruits
Musanga cecropioides	Moraceae	Fruits
Myrianthus arboreus	Moraceae	Fruits
Treculia Africana	Moraceae	Fruits
Uvariopsis dioica	Annonaceae	Flowers
Spondia mombin	Anacardiaceae	Fruits
Rauvolfia vomitoria	Apocynaceae	flowers and fruit
Blighia sapida	Sapindaceae	Fruits
Blighia welwithil	Sapindaceae	Fruits
Dacryodes edulis	Burseraceae	Fruits
Uapaca togoensis	Euphorbiaceae	Fruits
Strombosia pustulata	Olacaceae	Leaves
Trichilia lanata	Meliaceae	leaves and flowers
Croton hirtu	Euphorbiaceae	Leaves
Alchornea cordifolia	Euphorbiaceae	Fruits
Anthocleista nobilis	Loganiaceae	Fruits
Uapaca heudelotii	Euphorbiaceae	Fruits
Uapaca paludosa	Euphorbiaceae	Fruits
Uapaca vanhouttei	Euphorbiaceae	Fruits
Drypetes principum	Arecaceae	leaves and fruits
Stombosia grandifolia	Olacaceae	leaves and fruits
Pycanthus angolensis	Myristicaceae	fresh leves and fruits
Pterocarpus soyauxii	Fabaceae	flowers and fruit
Brachystegia eurycoma	Caesalpinioideae	Leaves
Canthiumhispicum	Rubiaceae	Fruits
Lonchocarpussericeus	Papilionoiceae	Pods

Appendix 2, Fruits Consumed Great Blue Turaco

Name of plants	Family	part Eaten	Observation%	
Chrysophyllum abidun	Sapotaceae	Fruits	1.01	
Chrysophyllum delevoyi	Sapotaceae	Fruits	1.03	
Cola ginganta	Malvaceae	Fruits	0.01	
Dialium guineense	Fabaceae	fruits	1.04	
Ficus latifolia	Moraceae	fruits	8.04	
Ficus capensis	Moraceae	fruits	3.03	
Ficus Esasperata	Moraceae	fruits	3.06	
Ficus glumosa	Moraceae	Fruits	1.01	
Ficus thoniigii	Moraceae	Fruits	2.01	
Musanga cecropioides	Moraceae	fruits	6.04	
Myrianthus arboreus	Moraceae	Fruits	3.03	
Treculia Africana	Moraceae	Fruits	3.01	
Spondia mombin	Anacardiaceae	fruits	3.01	
Blighia sapida	Sapindaceae	fruits	1.01	
Blighia welwithil	Sapindaceae	fruits	1.01	
Dacryodes edulis	Burseraceae	Fruits	6.01	
Uapaca togoensis	Euphorbiaceae	Fruits	5.01	
Alchornea cordifolia	Euphorbiaceae	Fruits	2.01	
Anthocleista nobilis	Loganiaceae	Fruits	2.01	
Trichilia lanata	Meliaceae	fruits	2.01	
Uapaca paludosa	Euphorbiaceae	Fruits	2.01	
Uapaca vanhouttei	Euphorbiaceae	Fruits	2.01	
Drypetes principum	Arecaceae	fruits	2.04	
Stombosia grandifolia	Olacaceae	fruits	2.01	
Pycanthus angolensis	Myristicaceae	fruits	4.01	
Canthium hispicum	Rubiaceae	Fruits	3.03	
Pterocarpus soyauxii	Fabaceae	fruit	1.04	
Rauvolfia vomitoria	Apocynaceae	fruit	1.03	
Lonchocarpussericeus	Papilionoiceae	fresh pods	1.03	
Albiza gummifera	Leguminosae	fresh pods	1.03	
Albiza gummifera	Leguminosae	fresh pods	1.04	
	74.68			

Species of Insects consumed the Great Blue Turaco

Name of insects	Family	Order	Part Eaten	Observation%
Atoconeura luxata	Libellulidae	Odonata	Whole	0.01
Atoconeura biordinata	Libellulidae	Odonata	Whole	0.01
Paragomphus sabicus	Gomphidae	Odonata	Whole	0.01
Ictinogomphus frassri	Gomphidae	Odonata	Whole	0.32
Notogomphus spinosus	Gomphidae	Odonata	Whole	0.02
Macrotermes bellicosus	Termitidae	Isopterea	Whole	3.01
Macrotermes natalensis	Termitidae	Isopterea	Whole	2.01
Campinotus pinnilucnicus	Formicidae	Hymenoptera	Whole	0.01
Rhinotermitidae	Formicidae	Hymenoptera	Whole	0.01
Anapha venata	Notodontidae	Lepidoptera	Whole	0.01
Euptoieta Claudia	Pieridae	Lepidoptera	Whole	0.01
Hypolimnas hysius	Pieridae	Lepidoptera	Whole	0.01
Mycelia antholia	Pieridae	Lepidoptera	Whole	0.01
Tanyterys pryeri	Petalurdae	Lepidoptera	Whole	0.01
				5.46