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Over two years Observations of the Biota of a Residential House

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Abstract: Thirty-three species of plants falling into 27 families were encountered. All these belonged to the Angiosperms clade except the shade plant *Cycas revolute* of the family Cycadaceae which is a Gymnosperm, All the plant species were categorized by the International Union for Conservation of Nature as least concern, except the Combretaceae *Conocarpus lancifolius* which was categorized as near threatened. The wild flora included 9 species belonging to 7 families. Twelve families of flowers and roses with a number of varieties were grown to perform a dual function beauties and availing nectar for butterflies and honeybees. Five species of vegetables belonging to five families were grown. Arthropods species included 2 Dipterans, 4 Lepidopterans, 8 Hymenopterans, one Blattodea, 3 Orthopterans 2 Odonata, 1 Hemipteran, 1 Isopteran, 2 Arachnids Araneae. Three amphibian *Sclerophyrus* spp., were seen during autumn. Reptiles found included 2 Scincidae, one Lacertidae, one Gekonidae and one Psammophisidae. Six species of cactus were grown as ornamental plants. Resident bird species included 1 Passeridae, 1 Pycnonotidae, 3 Laridae. The Rock Pigeons are daily victors, Blue-naped Mousebird and Glossy Starling are seasonal visitors. The Black Kite, Namaqua Dove, Carmine Bee-eater, Abyssinian Roller, were seen several times whole The Yellow-bellied Sunbird, Hoopoe and Red-billed Firefinch were seen few times. Abdim's Stork was seen once. The wild mammals found were 2 species of Muridae, 1 Erinaceidae, 1 Herpestidae and 2 Molossidae.

Keywords: Diversity, Flora, Fauna, Food pyramid, Garden.

INTRODUCTION

The biota diversity is the product of the interaction of available niches, water and food resources.

Arthropods are cosmopolitan in distribution except in Antarctica. Flies can be found in human houses, around food matter, decaying organic material and garbage (a-z-animals.com/animals/fly/; en.wikipedia.org/wiki/Fly). Many beetles are found in human gardens because they are moist and avail food (www.terminix.com/other/beetles/behavior/where-do-beetles-live/). This is also holds true for butterflies, moth, bees, wasps, dragonflies and neuropterans.

Some spiders are indoor and others are outdoor creatures (https://www.earthkind.com/blog/where-do-spiders-live-habitat). They feed mainly by sucking arthropods falling and trapped in their web. Many species of frogs and toads (Anura) utilize a verity of habitats such as grass of a garden as a food foraging site (http://meadowia.com>create-frog-habitat).

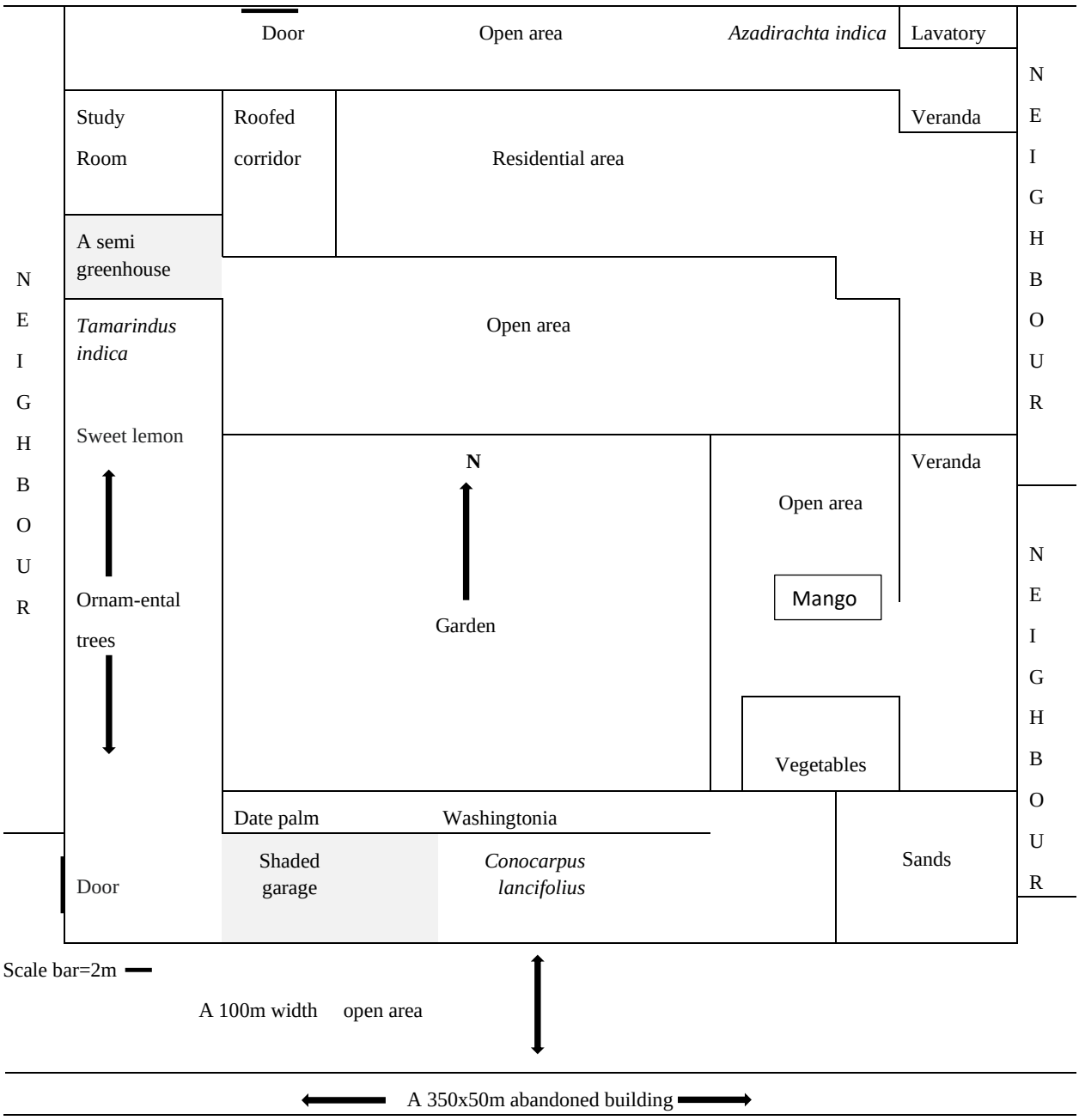
The house gecko *Tarantula annularis* clearly prefers urban environments as it hunt for insects in close proximity to urban lights (Newbery and Darryl, 2007). Skinks prefer habitats where they can dig or burrow in the sand or hide in leafy debris or basking in a stone (https://animals.net/skink). Bird habitats include man-made buildings and gardens and the nearby trees (Tu *et al*., 2020).

The man-made buildings attract house mice and other members of Muridae. Inhibited buildings avail shelter, breeding sites and food for these annoying creatures (Encyclopedia Britannica, https://www.britannica.com/animal/house-m).

The objective of this work is to contribute to the biota of Khartoum town by documentation of the flora and fauna of a residential house.

The study area

The study area is a house of 50x22m area (Map 1). Along the north and the south wall adequate number of culverts were made to facilitate run off of rain water outside the house. Sometimes small sized animals use these culverts to pass into or outside the house.



Map 1. The study area

Methods of collection and identification

Prior knowledge was used in identification of wild plants except for *Aerva javanica* which was identified based on an herbarium sample. Ants were collected using a strip of paper, dragged into 70% alcohol with a drop of glycerol and identified based on antsofafrica.org › new_records_sudan_species_list. Flying insects were collected by a butterfly net and were identified following Schmutterer (1969); Happold (1968) was used to check dragonflies and the internet images of *Aerva javanica*, *Emens lepelletieri* and *Emens maxilles* facelifted their identification. This holds true for the Arachnids *Pholcus* sp. and *Argiope* sp. Amphibians which are dissecting samples were collected by hand and the identification of *Sclerophrys pentoni* and *Sclerophrys xeros* was based on comparison with photos made by Frost (2018). The identification of reptiles and birds was based of 50 years of fieldwork of the junior author, bird identification guides of Cave and Mac Doland (1955) and Nikolaus, G. (1987) were also used.

Bats coming to the house from the abandoned building (Map 1) were collected by a butterfly net. *Taphozous perforates* indentation was based on description of Koopman (1975).

Photography

Photos were taken by a Nikon digital camera of the type DX (AF-Snikkor 18-55mm 1:3.5-5.6G) in addition to Samsung Duos smart phone.

Findings and Discussion

The Flora

Wild flora, not cultivated, which were found are all Angiosperms. They included Senna (*Senna alexandrina*, Fabaceae). The flowers are big in size and coloured yellow. Its pods are used as a laxative

for treatment of constipation in traditional medicine in Sudan and elsewhere (Ramchander and Middha, 2017). The dwarf purslane (*Portulaca* sp., Portulacaceae) was reported in Sudan about a century ago by Broum and Massey (1929. This herbaceous weed is claimed to cure diarrhea, dysentery, with diuretic anti-inflammatory and wound healing properties (Mubashir *et al*. 2011). The *Ciyyullus colocynthis*, Cucurbitaceae (Fig. 1). Two members of the family Apocynaceae the Milkweed (*Calotropis procera*) and *Leptadenia arborea* (=*heterophylla*) were found. Kapok bush (*Aerva javanica*, Amaranthaceae), *Tribulus terrestris*, Zygophyllaceae, *Cyperus rotundus*, Cyperaceae are also among the wild flora. Any wild plant whenever appeared was uprooted despite the claim of its medicinal properties. The branches of *Balanites aegyptiaca*, Zygophyllaceae extends from outside the house over the wall into the house. The White-vented Bulbul was seen using a loosely constructed nest over there.

Fig. 1. *Ciyyullus colocynthis*

Cultivated flora other than trees included a lawn of 12x14m of *Cynodon* sp. Poaceae, fenced by different ornamental shrubs, and an area of 5x7m of cultivated vegetables. A variety of white, pink and violet periwinkles "winka" *Catharanthus roseus* of the Family: Apocynaceae were grown as an ornamental plant. This plant can intoxicate those who consume it orally. *Lantana camara*, Verbenaceae shrub was cultivated because of it is beautiful mixture of red and yellow flowers. *Rosa damascene* and a number of coloured hybrid English roses (Family Rosaceae) were grown in soil as well as in clay pots. All flowers and roses are visited by butterflies and other nectar seeking insects.

Around 150 pots of flowers and roses, cactus and shadow plants were distributed all over the house. *Sansevieria trifasciata*, Apocynaceae was kept in shadow and indoor. The following pot plants *Pentas lanceolate*, Rubiaceae (with pink flowers), *Celosia argentea*, Amaranthaceae (with red flowers), *Echium vulgare*, Boraginaceae (its red flowers gradually change to blue), *Hippeastrum striatum*, Amaryllidaceae (with red. orange, pink and white flowers), *Hemerocallis fulva*, Asphodelaceae (with orange and red flowers) and two varieties of false banana (*Ravenala* sp.) one with red and one with yellow flowers were grown in the soil. Portulaca (Portulacaceae) flowers stems from the ever green creeping shoots. The plant with distinct flowers that might be white, orange, yellow, red or pink in colour and was grown in soil, clay, plastic and metal pots. Flowers and roses always attracts butterflies, honeybees and flies by their nectar. Varieties of periwinkles *Vinca herbacea* (Apocynaceae) with red or pink or white or violet flowers were grown.

Cactus plant included the alloeh Aloe sp. (Family; Asphodelaceae). Five members of the Family Cactaceae were grown. These were the sword-pear cactus (Acanthocereus Tetragonus); the barrel cactus (Echinocactus sp.); the ladyfinger cactus (Mammillaria elongate); angel's-wings (Opuntia microdasys) and cactus pear family Cactaceae (Opuntia sp.).

Cycas revolute, Cycadaceae was the only Gymnosperm grown. Together with *S. trifasciata* they performed very well in the semi green house.

All grown vegetables were Angiosperms. These were okra (*Abelmoschus esculentus*, Malvaceae), the Jute mallow (*Corchorus olitorius*, Malvaceae) and the common purslane (*Portulaca oleracea*, Portulacaceae) which were cooked as food. The cucumber (*Cucmits melo*, Cucurbitaaceae) and argula leaves (*Eruca vesicaria*, Brassicaceae) were used in salad for their fresh, bitter and pungent flavour.

The tree stands are all Angiosperms. They consisted of 6 trees of Damas (*Conocarpus lancifolius*, Combretaceae). There is one tree of the following: Neem (*Azadirachta indica*, Meliaceae); mango (*Mangifera indica*, Anacardiaceae); Date palm (*Phoenix dactylifera*, Arecaceae); Sweet lemon (a citrus hybrid) botanically classified as *Citrus limetta* family Rutaceae; tamarind (*Tamarindus indica*, Fabaceae) and Mexican fan palm (*Washingtonia* sp., Arecaceae) Figs. 2-4. Fresh leaves of *A. indica* due to their pesticide properties are scattered on carpets before rolling them up to deter carpet moth. Ay blankets or clothes wanted to be kept for a period of time are treated similarly.

Fig. 2. *Streptopelia decipiens* roosting in sweet lemon tree.

Fig. 3. *Tamarindus indica* fruits is a food source for *Urocolius macrourus*

Fig. 4. *Washingtonia* sp

Food availability

The flora is visited by an array of arthropods and vertebrates. In addition, there is a bird feeding center (Fig. 5) always filled with *Sorghum* sp. or *Pennisetum* sp., and rarely with *Triticum aestivum*. Every day during early morning dry bread is smashed and scattered on the ground as a source of food. Several plates are filled with water as drinking points.

Fig. 5. A bird feeding center in a shaded area

Arthropods

Arthropods are the most abundant faunal forms observed feeding on nectar, plant tissue, grains, insects or fermented food according to the feeding habits of the species. The Dipteran housefly *Musca domestica* were seen thought the year while the fruit fly *Drosophila melanogaster* were noticed whenever a ripe fruit is found, Lepidopterans like the Citrus Swallowtail *Papilio demodocus*; African Monarch *Anosia chrysippus*; Pioneer white (*Belenois aurota*) and the convolvulus hawkmoth *Agrius convolvuli*. Hymenopterans included ants, bees and wasps. The ant species found included *Monomorium niloticum*; *Camponotus maculatus*; *Brachyponera sennarensis* and *Catoglyphis bicolor*. The honeybees (*Apis mellifera*) is a daily visitor to flowers but no hive was made in the house. The wasps found were the yellow-red *Emens lepelletieri* and the large sized red-black *Eumens maxilles*. Three mud daubers multiple openings nests of *E. maxilles* (Fig. 6) were found on the wall of the corridor (Map 1). The Blattodea *Periplaneta americana* was always found in a detached lavatory. The Orthopterans found included *Anacridium aegytium*, *Sphingonotus* sp., and the House cricket *Acheta domestica*. The Coleopteran dome-shaped red with black spots Ladybug was seen frequently in the vegetable plot. *Adesmia antiqua* (Coleoptera) and the earthen traps of the larva of the ladybug net-winged insect were also encountered Figs. 7 and 8, respectively. The Odonata seen included the wandering glider (*Pantala flavescens*) Fig. 9 and Vagrant Emperor (*Anax ephippiger*). These feed on other live insects.

Fig. 6. A mud dauber

Fig. 7. *Adesmia antiqua*

Fig. 8. Neuropteran trap

Fig. 9. *Pantala flavescens*

The Hemipteran scale insect *Parlatoria blanchardi* whenever found on the leaves of date palm the leaves were cut and rapped in a newspaper and burned.

Swarms of the Isopteran *Microterms* sp. are usually seen after a rainy day immediately after sunset. The swarms attract *B. sennarensis*, geckos and bats. Two Arachnids Araneae were found. The cellar spider *Pholcus* sp. which lives in webs inside the house and the garden spider *Argiope* sp. which spread their webs across plants. The house maid disliked spiders and killed them and clean their webs from the wall, despite their role as pest checker.

Amphibians.

Few individuals of the common African toad *Sclerophyrus* (=*Bufo*) *regularis* (Fig. 10), the Penton's toad (*Sclerophrys pentoni*) and (*Sclerophrys xeros*) of the Family: Buffonidae find their way to the house few days after the early precipitations and disappeared after the end of the rainy season. They were observed feeding during the day on insects. They mate "indicate by male croak" and breed in the pool created by rains in the open area south of the house (Map 1).

Fig. 10. *Sclerophyrus regularis*

Fig. 11. *Latatsia longicaudata*

Fig. 12. *Tarentula anuralis*

Reptilia

Reptiles reported belonged to 4 families. *Chalcedes ocellatus* and *Trachyleps quinquetaeniata* (Scincidae), and *Latatsia longicaudata* (Lacertidae, Fig. 11) were observed crawling on the ground chasing insects as source of food. *Tarentula anuralis* (Gekonidae, Fig. 12) is permanently resident mostly behind cupboards and sometimes behind the frames of hanged pictures. They are nocturnal feeders spending time around electric lambs eating moths and other flying insects attracted to the light source as long as they are switched on. The house maid whenever gets the chance to kill geckos she did because she hated them. In one occasion the gardener found and killed a *Dasypeltis scabra* an egg eating snake of the family Psammophisidae.

Aves

A diversity of resident and visitors' bird species were recorded. The resident species included: (1) The House Sparrow, *Passer domesticus* (Passeridae, Fig. 13) which make nests in the gaps between the corrugated iron sheets and wall or inside rain gutter. (2) The White-vented Bulbul *Pycnonotus barbatus* (Pycnonotidae) Fig 14. (3) The Laridae Red-eyed Dove *Streptopelia semitorquata*, Laughing Dove *Streptopelia senegalensis* and The Mouring Collard Dove (*Streptopelia decipiens*, Fig. 2). These roost in various trees. With respect to feeding, these species feed on smashed bread and grains falling from the feeding center (Figs. 5 and 13). The feeding center is visited only by *P. domesticus.* The rock Pigeons *Columba livia* (Laridae) are daily victors and stay as long as food is available. While feeding pigeons were seen deterring *P. barbatus*. The Blue-naped Mousebird *Urocolius macrourus* (Coliidae) is a vigorous fruit eater. In the morning and the afternoon it daily visits *T. indica* during fruit production season (Fig. 3).

The Glossy Starling *Lamprotornis caudates* (Sturnidae) was a visitor during autumn. The Black Kite *Milvus migrans* (Accipitridae) usually perch during the mid-day on the top of *M. indica.*

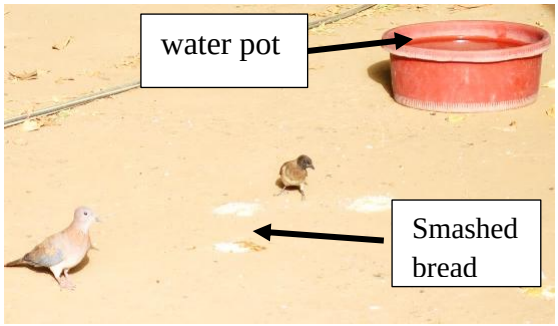


Fig. 13. *Passer domesticus* and *Streptopelia senegalensis* (bottom left)

Fig. 14. *Pycnonotus barbatus*

The Namaqua Dove *Oena capensis* (Laridae), The Carmine Bee-eater *Merops nubius* (Meropidae) and The Abyssinian Roller *Coracias abyssinicus* (Coraciidae) were observed 10, 10 and 8 times, respectively. The yellow-bellied sunbird *Cinnyris venustus* (Family Nectariniidae) was seen several times humming around *Pentas lanceolate* feeding on its nectar.

The Hoopoe *Upupa epops* (Upupidae) and The Red-billed Firefinch *Lagonosticta senegala* (Estrildidae) were seen thrice each. The Ciconiidae Abdim's Stork *Ciconia abdimi* was seen once. A sub-adult Black Kite (*Milvius migrans*, Accipitrida) breached for three hours on a car shade (Fig. 15) during a hot mid-summer day, prior to flying away before sunset.

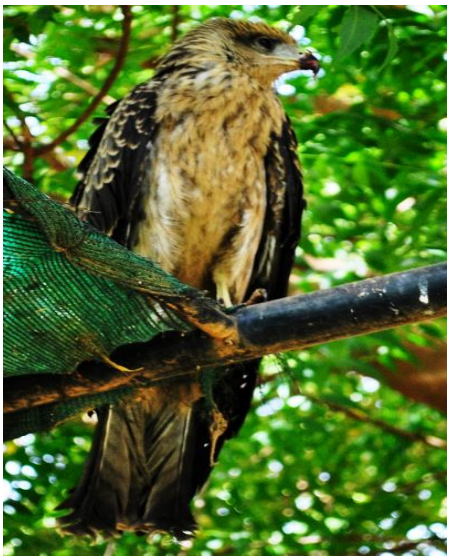


Fig. 15. A sub-adult of *Milvius migrans*

Mammalia

Six species of mammals belonging to 4 families were found. The House mouse *Mus musculus* and the African grass rat *Arvicanthis niloticus* (Muridae) were rarely observed. If they fall into the mouse trap they are taken to feed snakes in the Natural History Museum. The Hedgehog *Atelerix albiventris* (Erinaceidae) was observed five times searching for food. A group of 3 to 5 slender *Herpestes sanguineus* (Herpestidae) visit the green grassland daily after sun set and stay up to 4 or more hours if the lawn was wet. They find their way in and outside the house via a 10 cm gap beneath the western door and the floor. If it was raining, they never show up. This mongoose spent the time playing and flapping their tails while looking for food items such as insects and reptiles. This is a distorted feeding behavior of these diurnal animals (Taylor, 1975; Gittleman and Harvey, 1982) imposed probably by the expansion of human residential areas. In 3 occasions the neighbors claimed that the killed unlocked sheep's and fed of the liver. Attempts to find their dens was not successful even in the surroundings of the house. Members of Molossidae seen included *Tadarida* (*Mops*) *midas* and *Taphozous perforates* bats. They roost in the abandoned building Map 1.

Food pyramid

Observations on the feeding habits of the various fauna enabled construction of a five level food pyramid (Fig. 16).

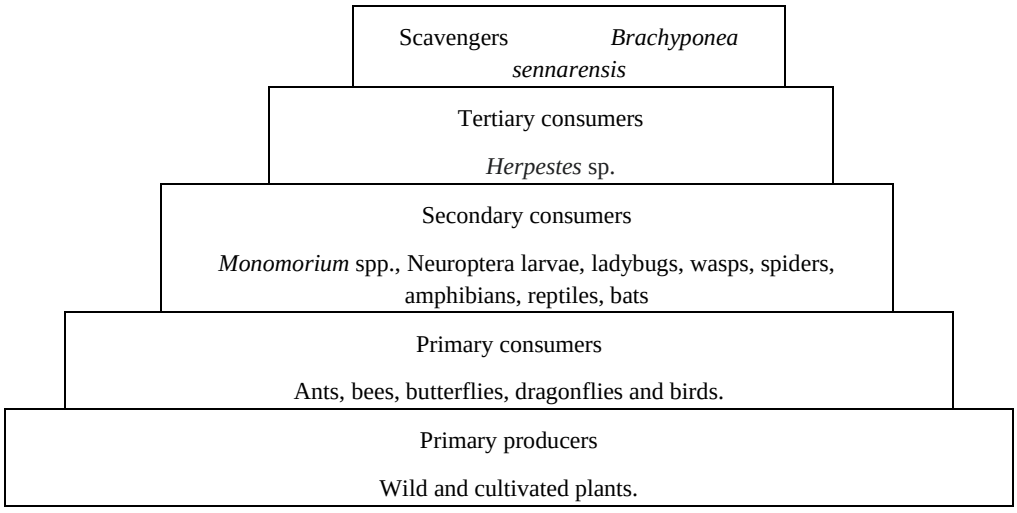


Fig. 16. Food pyramid

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