

Summary

Honey bees are not the only bee species that are significant for human wellbeing. *Xylocopa* bees are a group of native bee species that do not produce honey but are important pollinators of crops and wild plants. *Xylocopa* bees do have quite a painful sting but they are not aggressive and will only sting for defence. Individuals live independently of the others (i.e. they are solitary) or in small groups. *Xylocopa* bees are larger than honey bees, hairy, often colourful and their wings make a loud buzzing sound while flying. Because of this conspicuousness they are well known in the region but are not known by the local people in East Africa as bees. *Xylocopa* male and female individuals have differences in coloration, which makes most farmers to believe they are different species. They live independently of others (i.e. they are solitary). *Xylocopa* bees nest in tree trunks, in dead wood, bamboo, or structural timbers. They construct their nests by boring tunnels in wood materials, which is why they are known as carpenter bees. This fact sheet provides information about these bees to encourage farmers to understand and protect them to help ensure that their crops are effectively pollinated.

From a conservation and agricultural standpoint it is not necessary to recognise all the different bee genera. However, it is important to know that there is a large bee biodiversity. Different bee genera pollinate different plant species, although there is some overlap that acts as a buffer as bee populations wax and wane. For healthy ecosystems, including agro-ecosystems both diversity and abundance in the bee fauna is important.



Common Name (Language)

Carpenter bees, large carpenter bees, wood-cutter bees (English), bizunzuri (Luganda - Uganda)

Scientific Classification

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Hymenoptera
Family: Apidae
Subfamily: Xylocopinae
Tribe: Xylocopini
Genus: *Xylocopa* Latreille, 1802



Species in the Genus

The genus *Xylocopa* is a diverse, widely distributed group of solitary bees. Worldwide, there are about 500 species of carpenter bees representing 31 subgenera.

Species in Kenya, Tanzania & Uganda

It is likely that more than the 63 described *Xylocopa* species from Kenya, Tanzania, Uganda (Eardley and Urban 2010) occur in the region. Three of the most common species in these countries are *Xylocopa caffra*, *Xylocopa inconstans* and *Xylocopa calens*. It is recommended that thorough surveys are carried out to determine exactly what species occur in East Africa and their distributions within the region.

Description

Xylocopa bees are not known by the local people in East Africa as bees (the name bee is generally thought only to apply to honey bees in the region) though they are well known particularly due to their nesting habits. These hairy bees are usually larger than the honey bee in size and their wings make a buzzing sound while flying. This habit increases the chances of the recognition of the species by the public (Kasina et al., 2009). *Xylocopa* male and female individuals look different in coloration, which makes most farmers to believe they are different species. Female *Xylocopa* bees are capable of stinging and the sting can be quite painful, but

they are docile and rarely sting unless captured or provoked. Most common large carpenter bees are named by farmers according to their size and colour such as “yellow big”, “yellow small”, “black small”, “black big” Bizunzuri. In most cases, they are known to be large insects living in house walls and wooden materials but they are not known as bees.

Possible Causes of Confusion

Some insect species particularly large beetles frequently encountered in tree trunks, could be confused with *Xylocopa* bees. Beetles have hardened fore-wings (elytra) while bees have four membranous wings. *Xylocopa* bees can be confused with so called “Small carpenter”. These bees belong to two distinct groups; *Ceratina* and several genera belonging to the tribe Allodapini. *Ceratina* bees have similar nests to *Xylocopa*, but they are much smaller. They are often heavily sclerotised (“armoured”) with coarsely punctured (punctate), and sometimes metallic blue or green coloration. Several of the species of small carpenters belonging to the tribe Allodapini are social and most do not separate their nests into separate cells. Some are parasitic.

Distribution in Kenya, Tanzania & Uganda

Xylocopa bees are found in most districts/regions of Kenya, Tanzania and Uganda (Eardley et al. 2009).

Habitats

Xylocopa bees can be found in various habitats (land-uses) in East Africa such as grasslands, natural forests, marshlands, open habitats, protected areas, farmlands, rangelands, woodlands, woodlots (forest plantations), riparian areas and coastal areas.

Nesting

Xylocopa bees live independently of the others (i.e. they are solitary) or in small groups. *Xylocopa* bees nest in tree trunks, in dead wood, bamboo, or structural timbers found in sheltered sites (Michener 2007). They construct their nests by boring tunnels in wood materials, which is how they get their common name. They vibrate their bodies as they rasp their mandibles (jaws) against the wood. Each nest has a single entrance which may have several adjacent tunnels. *Xylocopa* bees discard the wood fragments produced by their drilling or re-use these particles to build partitions between cells. The tunnel functions as a nursery for brood and storage for the pollen/nectar upon which the brood subsists. Some species tunnel in wood in homes but the structural damage is virtually non-existent as the tunnels are not deep. In several species, the females live alongside their own daughters or sisters, creating a semi-social group.

Crops Visited

Xylocopa bees collect nectar and pollen from various flowering crop species belonging to different plant families found in East Africa. These bees are efficient pollinators of crops such as eggplant, beans, cowpeas, simsim (sesame), passion fruit, and apples. They are able to perform buzz pollination, which is very important for crops such as tomatoes, kiwi fruit, eggplants and chillies whose pollen is held firmly by the anthers. This makes them ideal candidates for greenhouse pollination of these crops, which is becoming an important enterprise in East Africa.

Other Plants Visited

In East Africa, *Xylocopa* bees visit various plant species, notably those in the Fabaceae, Malvaceae and Rubiaceae families. In East Africa *Xylocopa* bees are wild bees (not yet domesticated) that visit various wild plant species (trees, shrubs, herbs, weeds, lianas, grasses) found in different habitats. These bees preferentially visit plant species with large yellow, white and purple coloured flowers.

Economic / Ecological importance

Xylocopa bees are important pollinators of open-faced flowers. Some crop species such as those in the genus *Passiflora* are completely dependent on *Xylocopa* bees for pollination (i.e. they are obligate pollinators). Large carpenter bees are also important pollinators of other fruit crops and pulse crops. They increase agricultural productivity and assist in the conservation of the natural biological diversity in the region.

Threats

In East Africa, *Xylocopa* bees and other bee taxa are threatened by factors such as habitat degradation, agricultural intensification (e.g. replacing hedges with barbed wire fences, and increased use of herbicides which can affect wild flower numbers) and the misuse of insecticides. Wood collection could drastically reduce these bees particularly due to elimination of their nests and/or killing of the brood. *Xylocopa* bee populations in East Africa are likely to be affected by pests and diseases but information on this subject is lacking. The lack of knowledge of about these bees and their economic importance by people (*de facto* custodians of nature) is significant as their conservation and management practices implemented at the farm level will depend to a large extent upon the value that people attach to them.

Conservation and Management Practices

Little information exists on the usefulness of these bees to the lives of the people in East Africa. However, there are now concerted research efforts in the region to develop best practices for conservation and management of bees that are compatible with other good farm practices, to enhance crop production. Theoretically, bee conservation and management is inexpensive and adopted activities can also improve the aesthetic value of the landscape. Such practices involve setting land aside (e.g. a 1-metre strip) in the farmland to host all year round food resources for the bees, as well as safer sites for nesting, mating, resting and refuge from natural enemies. During flowering, farmers should manage pesticide usage carefully to avoid poisoning flower-visiting bees. Farmers should also minimise pesticide drift from the field to adjacent areas. Laws governing registration and use of plant protection products indirectly play a major role in the protection of pollinators. Wood collection should be managed to conserve nesting sites these wood-nesting species. KARI (the Kenya Agricultural Research Institute) is developing protocols for mass rearing of different species of solitary bees. Any successful results from this research will be freely communicated to the public. In addition, KARI is collaborating with other stakeholders to ensure *in situ* conservation and management of bees for pollination purposes. Much of the work of conserving native bees will be underpinned by raising public awareness of the importance of these species.

Legislation (National and International)

There is not yet any legislation in East Africa that explicitly addresses pollinators. However, there is scattered legislation for the protection of biodiversity particularly that covering environmental protection, protection of wildlife and heritage sites, protection of forests and natural resources such as water catchments. In addition, laws governing registration and use of plant protection products also indirectly play a major role in the protection of pollinators. Such legislation, together with market-based mechanisms such as the Good Agricultural Practices (GAPs) codes and practices may help to protect bees albeit incidentally. At the international level, the Conservation on Biological Diversity (CBD) is spearheading strategies to enforce bee management for pollination purposes within the member countries, which include Kenya, Tanzania and Uganda. Farmers should lobby their governments to develop Integrated Pest Management policies that would protect bees and other insects of importance in agriculture.

References

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