

Article

A new record of *Allamanda cathartica* Linn., 1771 (Angiosperms: Apocynaceae) as a host plant of weaver ant, *Oecophylla smaragdina* Fab., 1775 (Hymenoptera: Formicidae)

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Abstract

The weaver ant species, *Oecophylla smaragdina* Fab., 1775 is found in the tropical regions of Asia, Australia, and western Pacific islands. It is arboreal in habit and constructs leaf nests in the upper canopy of trees. The interactions between *O. smaragdina* and its host plant can be considered a type of mutualism, as both are benefitted. Many plant species including seven species of family Apocynaceae have been recorded as the host plants of *O. smaragdina*. In the present study, we have added golden trumpet, *Allamanda cathartica* Linn., 1771, an ornamental plant belonging to family Apocynaceae to the list of plant species that host *O. smaragdina* ants.

Keywords ant-plant interactions; Asian weaver ant; edible insect; myrmecophily.

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1 Introduction

The weaver ant *Oecophylla smaragdina* Fabricius, 1775 (Fig. 1a) is an insect species belonging to subfamily Formicinae in family Formicidae of order Hymenoptera. These ants are arboreal and are among the most dominant and important ants in tree canopies of the humid tropics of South-East Asia, Australia and western Pacific islands (Blüthgen and Fiedler, 2002). Weaver ants build large distinctive nest structures in trees by binding together bunches of leaves using a silk-like substance secreted by the larvae. Groups of *Oecophylla* workers hold the leaves together while other workers move the silk-producing larvae back and forth across the gap, effectively weaving the leaves together (Wetterer, 2017). These ants are a valued resource in some Southeast Asian countries since they are edible (Sribandit et al., 2008). These ants are also consumed by indigenous people in different states of India (Jena et al., 2020). These ants prey on other insects and are able to protect a variety of terrestrial plants against pest insects (Offenberg et al., 2006). As these ants protect the host plants from phytophagous insect attacks, they have been used for biological control in the tropics (Tsuji et

al., 2004). The relatively greater efficiency of *O. smaragdina* as a biological control agent is associated with its actively dispersive predatory behaviour (Way and Khoo, 1991). In India, these ants are found on a number of plant species, but the most preferred host is mango, *Mangifera indica* (Jena et al., 2020). Here, we are reporting *Allamanda cathartica* Linn., 1771 (Fig. 1b) as a host plant of *O. smaragdina*.

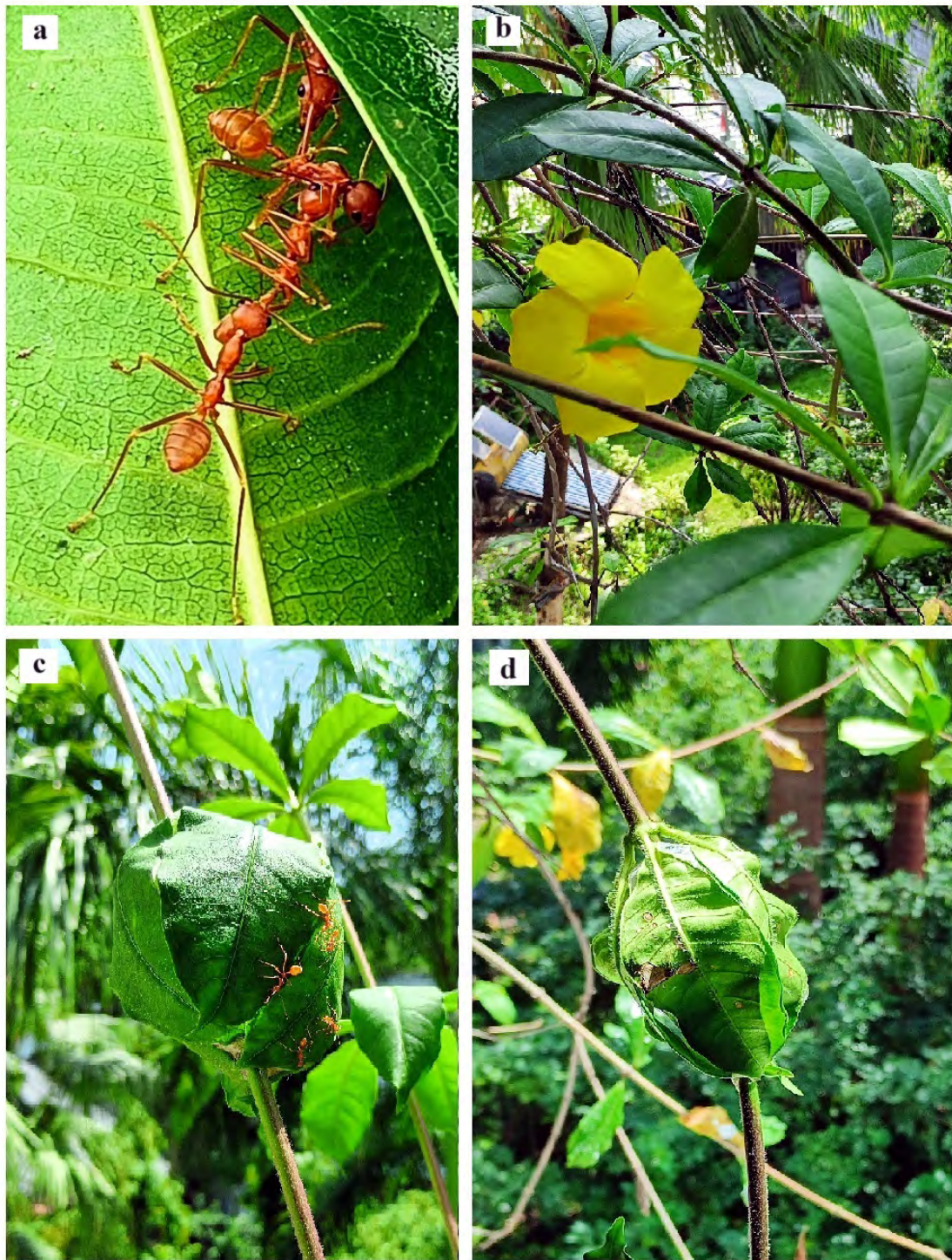


Fig. 1a-d (a) *Oecophylla smaragdina* workers (b) *Allamanda cathartica* plant (c) *O. smaragdina* leaf nest on *A. cathartica* (d) A smaller weaver ant nest on *A. cathartica*.

2 Materials and Methods

The present study was conducted in September 2023 in S.M.M. College of Science Campus in Nagpur city. Nagpur (C. 21.1498°N 79.0806°E) is located in the central region of India. The climate of Nagpur is tropical wet and dry, with dry conditions dominating most of the year. The monsoon rains last from June to September and the average annual rainfall is 1064 mm. May is the hottest month and July is the rainiest month in Nagpur (Anon., 2023). During a survey of weaver ant nests in our college garden, we found a few weaver ant nests on an *A. cathartica* plant. These nests were studied and then photographed with a digital camera. The plant species was identified with the help of the guide on family Apocynaceae by Morillo and Liede-Schumann, 2021.

3 Results

We observed three weaver ant nests on the *A. cathartica* plant studied. This particular plant grew to a height of about 20 feet from the ground and the weaver ant nests were constructed in its upper branches. As *O. smaragdina* leaf nests have previously not been reported on *A. cathartica*, this is the first record of this plant species being used as a host by weaver ants. The ant nests observed on *A. cathartica* were smaller in comparison to the ant nests observed on a mango tree in the same garden. Out of the three leaf nests observed on *A. cathartica*, the larger nest had a width of about 12 cm (Fig. 1c), whereas, the other two nests were smaller having a width of about 7.5 cm (Fig. 1d). The leaves of *A. cathartica* are arranged in whorls of five and these whorls are separated from each other on the stem, hence the small size of the leaf nests. *O. smaragdina* ants are highly territorial and aggressively defend a resource-based territory (Newey et al., 2010). We found that even gently touching the leaf nest caused worker ants to rapidly come out of the nest and actively look for the intruder.

4 Discussion

Weaver ant *Oecophylla smaragdina*, native to Asia, has been recorded on 175 plant species in 46 families, while the related species *Oecophylla longinoda*, native to Africa, has been recorded on 66 plant species in 34 families (Lim et al., 2008). Apocynaceae is a pantropical family of trees, shrubs, lianas, and herbs, generally found below 2500 m elevation and represented in the Neotropics by about 100 genera and 1600 species (Morillo and Liede-Schumann, 2021). *O. smaragdina* has been reported on the following host plants of family Apocynaceae: *Alstonia actinophylla*, *Dyera costulata*, *Ichnocarpus frutescens*, *Melodinus australis*, *Plumeria obtusa*, *Wrightia laevis*, and *Wrightia pubescens* (Lim et al., 2008).

Allamanda cathartica belongs to family Apocynaceae and is commonly known as golden trumpet, common trumpetvine, and yellow allamanda. *A. cathartica* is a native of South America (Petricevich and Abarca-Vargas, 2019). It is found in many tropical regions including India (Prabhadevi et al., 2012) and its neighbouring countries, which include Bangladesh, Nepal (Mahbubur Rahman and Akter, 2015), Myanmar, Pakistan (Hameed et al., 2014), Sri Lanka (Rifnas et al., 2020) and China (Li et al., 2014). This plant species is widely cultivated in the tropics because of its beautiful yellow flowers (Morillo and Liede-Schumann, 2021). Besides being economically important as an ornamental plant, *A. cathartica* has also emerged as a source of traditional medicine used for human health, since the extracts and active substances isolated from it have been found to have multiple pharmacological activities (Petricevich and Abarca-Vargas, 2019). The extract from *A. cathartica* flowers has been used to synthesize silver nanoparticles (Karunakaran et al., 2016).

Ant-plant interactions have mainly been considered as a protection mutualism where ants increase plant performance through protection from herbivory (Pinkalski et al., 2016). In a mangrove forest, it was found that on trees with *O. smaragdina* ants, there was less herbivory on leaves close to ant nests compared to other leaves on the trees (Offenberg et al., 2006). In our study too, we found that there were no other insects visible

near the ant nests on the *A. cathartica* plant. These ants may provide their host plant with a significant source of nitrogen albeit a substantial amount of carbon is consumed from the host plant (Pinkalski et al., 2016). The evolution of territorial behaviour requires that the benefits of territoriality outweigh the costs, which are primarily those of territorial defense against encroaching neighbors or against floaters seeking to establish their own territory (Newey et al., 2010). It is possible that these ants on account of their aggressive nature may also have a negative effect on the visiting rate of pollinator insects of the host plants (Tsuji et al., 2004).

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