



Seasonal variation in the nest construction of *Oecophylla smaragdina* (Weaver Ant)

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Abstract: This study investigates the seasonal variation in the nest construction behavior of *Oecophylla smaragdina* (weaver ants) in a mango garden located in Mokhada, Maharashtra. Weaver ants are known for their unique nest-building behavior, where they use the silk produced by their larvae to weave leaves together. The study focuses on how environmental factors such as temperature, humidity, and mango fruiting cycles influence the nest-building activities. Data were collected over the course of one year, with observations made in different seasons: pre-monsoon, monsoon, and post-monsoon. The findings suggest that nest construction activity fluctuates with changes in the availability of food resources, environmental conditions, and reproduction cycles of the ants. Nest construction peaked during the pre-monsoon season.

Key words: Weaver ants, *Oecophylla smaragdina*, nest construction, seasonal variation, mango garden, Mokhada.

Introduction:

Arboreal and eusocial, weaver ants (*Oecophylla sp.*) belong to the Formicidae family of insects and the Hymenoptera order. They are important for food, medicine, and pest control (Itterbeeck et al., 2014). For social insects, the success of the colony depends on their capacity to find appropriate nesting locations and, by modifying their surroundings, build frequently quite intricate nests (Hölldobler and Wilson 1990). Two ant species in particular, belonging to the genus *Oecophylla*, exhibit dominant social behavior. In a number of Asian nations, *Oecophylla* ant larvae are commercial items from which oil can be extracted, utilized as a food product, etc. (Joachim Offenberg et al., 2013). Weaver ants (*Oecophylla smaragdina*) are important ecosystem engineers, primarily recognized for their intricate nest-building behavior. These ants are known to form large

colonies in trees, often weaving together leaves using silk produced by their larvae. Their nests play a crucial role not only in their survival but also in maintaining ecological balance by controlling pest populations, particularly in agricultural settings (Hölldobler & Wilson, 1990). In India, mango gardens provide a significant habitat for weaver ants, where they influence the health of mango crops and serve as natural pest control agents by preying on harmful insects like aphids and caterpillars (Kumar et al., 2011).

The seasonal variation in nest-building behavior of weaver ants has been documented in various parts of the world but remains understudied in tropical agricultural environments such as those in Maharashtra, India. Previous studies in Southeast Asia suggest that factors such as temperature, humidity, and food availability significantly affect the nest construction activities of *Oecophylla smaragdina* (Fischer et al., 2005; Suryanarayanan et al., 2014). The aim of this study is to analyse how seasonal changes in climate and food availability impact the nest construction behavior of weaver ants in a mango garden in Mokhada, a region characterized by a distinct tropical climate. Understanding these seasonal patterns is crucial for assessing the role of weaver ants in integrated pest management (IPM) and their broader ecological impact on mango agriculture in the region.

MATERIALS AND METHODS:

Study area:



The study was conducted in a mango garden located in Mokhada, Maharashtra, during a period of one year, from March 2024 to February 2025. The region has a tropical climate with three distinct seasons:

1. Pre-monsoon (March to May)
2. Monsoon (June to September)
3. Post-monsoon (October to February)

The garden is small size, and the primary species of mango present is *Mangifera indica*. The area supports a significant population of weaver ants, with nests commonly found on mango trees.

Data collection:

Nests: The nests of *Oecophylla smaragdina* were located and documented in the mango trees. Data were collected monthly, noting the number of nests.

Nest Construction Activity: Nest construction was observed by monitoring the number of new nests being built and the maintenance of existing nests.

Analysis: Data were analyzed to detect seasonal trends in nest construction activity, comparing the number of new nests constructed per month and correlating these trends with changes in environmental factors and food availability.

Result:

The Seasonal Trends in Nest Construction-

Pre-Monsoon (March to May): During the pre-monsoon season, nest construction peaked, with a significant increase in the number of new nests. The availability of young mango shoots and the absence of heavy rainfall provided ideal conditions for weaver ants to build and maintain their nests. Temperatures were high, and humidity levels were moderate, creating favorable conditions for foraging and nest-building.

Monsoon (June to September): Nest-building activity decreased significantly during the monsoon season. Heavy rainfall led to cooler temperatures, and high humidity levels may have made the environment less conducive for nest construction. Mango fruits were abundant during this period, but the ants seemed to shift focus toward gathering food rather than building nests.

Post-Monsoon (October to February): There was a slight resurgence in nest construction activity in the post-monsoon season, though not as pronounced as in the pre-monsoon season. The climate was more temperate, and the mango trees had fruit and new leaves, providing a steady food source. The ants were observed to reinforce existing nests during this period.



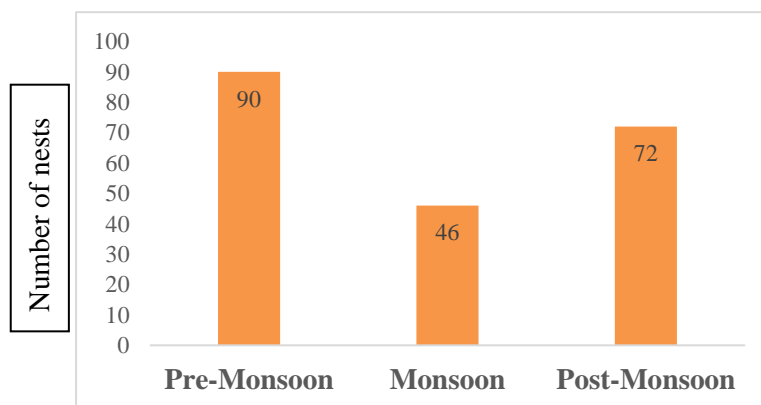
Photo plate: Nest of Weaver ants observed in study area

Table 1: Seasonal variation recorded in study area

Season / Activity	Pre-Monsoon (March to May)	Monsoon Season (June to September)	Post-Monsoon (October to February)
Nest	Nests are medium-sized	Nests are larger and more complex, with ants weaving multiple leaves together	Nests tend to shrink or become more scattered
Ant Activity	Moderate to high activity	High activity due to abundant food sources	Activity decreases as food becomes scarce
Food Availability	Mango trees and other plants start to lose some of their greenery, reducing available food. Ants may forage more actively	Abundant food sources from new mango shoots, insects, and other vegetation	Limited food due to reduced foliage and fruit availability
Nest Maintenance	Moderate	High maintenance activity	Minimum maintenance

Table 2: Season-wise number of nests observed in study area

Season	Month	Number of Weaver Ant Nests (Small, medium and large size)	Total number of nests
Pre-Monsoon	March	25	90
	April	30	
	May	35	
Monsoon	June	12	46
	July	8	
	August	16	
	September	10	
Post-Monsoon	October	15	72
	November	10	
	December	18	
	January	12	
	February	17	

**Fig.1: Seasonal variation in nest construction of weaver ants**

Correlation with Environmental Factors:

Nest construction was positively correlated with moderate temperatures and dry conditions, especially in the pre-monsoon period. Humidity, however, showed an inverse relationship, with nest construction declining during periods of high humidity (monsoon season).

Food Availability:

The availability of mango fruits appeared to influence the frequency of nest maintenance rather than the building of new nests. The ants used mango fruits as a food source during the monsoon, which may have reduced their need for constructing new nests.

DISCUSSION:

The seasonal variation in nest construction observed in this study aligns with patterns seen in other tropical regions, where ants adjust their behavior according to environmental and resource availability. The pre-monsoon season's favorable conditions for nest construction are likely due to the increased availability of food resources, such as young leaves and mango shoots, coupled with relatively dry conditions. During the monsoon, when conditions are less favorable for nest construction, the ants likely conserve energy, focusing instead on food collection. The reduction in nest-building activity during the monsoon may also be a strategy to prevent nest flooding or damage from heavy rainfall. The post-monsoon period showed a balanced approach, with moderate nest-building activity as the ants reinforced and maintained their nests for the upcoming dry season.

According to the finding of Thangavel Rajagopal et al. (2019). In urban areas, due to the pollution and human activity, the nesting activity of weaver ants was disturbed. Weaver ants choose both rural and urban areas for nest construction, but some factors like temperature and humidity affect the weaver ants nest construction activity. Simply in urban areas, the diversity of weaver ants' nests is reduced as compared to rural areas. The Mokhada region lies in a rural area; hence, the diversity of weaver ant nests is seen in a maximum number, especially in the pre-monsoon season.

CONCLUSION:

This study provides valuable insights into the seasonal variations in nest construction by *Oecophylla smaragdina* in a mango garden. The findings underscore the influence of environmental factors such as temperature, humidity, and food availability on the nest-building behavior of weaver ants. In the pre-monsoon season, the number of weaver ant nests is higher compared to other seasons. Understanding these seasonal patterns can help in better management of weaver ants in agricultural settings, potentially improving pest control strategies in mango gardens. Further research is recommended to explore the relationship between ant colonies and mango tree health, as well as the role of weaver ants in integrated pest management.

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