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IMPACT OF WEATHER FACTORS ON COLONY INHABITATION AND ABUNDANCE OF THE ASIAN WEAVER ANT *OECOPHYLLA SMARAGDINA* (F)

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ABSTRACT

Colony inhabitation and abundance of *Oecophylla smaragdina* (F) nest have been explored in the Krishnagiri district of Tamil Nadu through field studies. Twenty-seven species of plants under 17 families were observed to inhabit *O. smaragdina.* Colony inhabitation occurred in 20 plant hosts for all the six months: in *Pongamia pinnata* it was observed for only two months. Number of nests were maximum with *Mangifera indica* (42.67), *Citrus limon* (29.17), *Azadirachta indica* (23.50). Temperature has a significant relationship with colony inhabitation and nesting. Rainfall, rainy days, cloud and relative humidity substantially reduce the colony's composition. The colonies does not appear to be influenced by the maximum wind speed, average gust or UV Index.

Key words: *Oecophylla smaragdina*, colony distribution, colony abundance, *Pongamia pinnata*, *Mangifera indica*, *Citrus limon*, *Azadirachta indica*, hosts, nest numbers, weather factors, Krishnagiri district, Tamil Nadu.

The Asian weaver ant *Oecophylla smaragdina* (F) successfully controls pests of various crops including cashew (*Anacardium occidentale* L). In Africa, habitats such as tree crop plantations is occupied by 'territorially dominant' arboreal ant species (Parr and Gibb, 2010) like *O. longinoda* (Hymenoptera: Formicidae): *Oecophylla.* spp. are characterized by populous colonies, the ability to build larger and/or polydomous nests and a highly developed intra- as well as interspecific territoriality (Crozier et al., 2010) . These make their territories to be distributed in a mosaic pattern in tree canopies (Majer, 1972; Dejean et al., 1994; Blüthgen and Stork, 2007). Ants have a major influence in many habitats given their abundance, their stability as populations and their feeding habits. Ant species make use of circadian clocks to occupy specific territories at different times. Weaver ants (Hymenoptera: Formicidae) are predatory insects that are widely used as bioagents for the control of insect pests (Materu et al., 2014; Olotu et al., 2013; Peng and Christian, 2007; Way, 1954; Way and Khoo, 1992). The ability of ants to protect plants against pests is related to their activity pattern (foraging to prey and foraging/patrolling to leave cues on fruits). Dejean (1990) noted several conclusions from studies that investigated the activity pattern of *O. spp*. Weaver ants exhibit a unique strategy of nest building on the tree using the leaves for nest construction. The mated *O. smaragdina* queen starts its colony by laying the first batch of about 35 eggs underneath tree leaves and taking care of the eggs until they hatch into worker ants (Lokkers, 1990). The worker ants exhibit a bimodal size distribution in which the major workers are approximately 8-10 mm in length, and the minors are roughly half the length of the majors (Wilson and Taylor, 1964). The existence of nocturnal peak of readiness to display nest-building behaviour is controversial in the case of *0. smaragdina,* and in the case of *0. longinoda* the daily pattern of readiness to display nest-building and nest-repairing activities is so far almost totally unknown (Hemmings, 1973). In this experiment, efforts have been made to identify the hosts of *O. smaragdina* in locality where the ant colony's population and abundance are regarded biotic factors. Also, how the short-term weather factors will influence the population has been studied.

Conditions to a particular invasive species may become more favorable (Roura-Pascual et al., 2004), and species coexistence and resource use may change (Sanders and Gordon, 2004), thus altering the susceptibility of communities to invasion (Cleland et al., 2004). The rate of spread of *Linepithema humile* populations can vary considerably across habitats, seasons, and years (Digirolamo and Fox, 2006). Robertson (1988) hypothesized that levels of ant predation on insect pests can be altered by seasonal changes. The reported study is a regional study to identify the host and abundance of *O. smaragdina.* Yet, factors influencing the activity patterns of *O. smaragdina* species remain almost undocumented, especially for the environmental conditions of Tamil Nadu. Study of the circadian activity pattern of the weaver ant *O. smargdina* and the influence of certain factors is of great ecological interest because it affords an opportunity to clarify some elements of the spatio-temporal distribution of weaver ant species at the scale of both the tree and the orchard. This research offers information on the host quantity, number, and impact of weather on *O. smaragdina* nest in selected areas of Krishnagiri district.

MATERIALS AND METHODS

This study was done in the Krishnagiri district's Burgur, Mookandapalli, Kaveripattinam, and Marandahalli taluks (12^{o}32'44" and 78^{o}13'36"), in Tamil Nadu. The all-out search approach was used to determine the colony inhabitation of *O. smaragdina* in various plant hosts. Each of the trees/plants in the study site was surveyed for the presence of ants, in the following sequence. Firstly, the trunk and lower branches (in case of trees) and whole plant (in case of shrubs) were examined for ant trails. If no ants were found, binoculars were used to scan the canopy for trails and nests. The presence of nests alone was never accepted as proof of ant presence, as nests were often abandoned in seemingly healthy condition during colony contraction periods. Some large trees had dense foliage that obstructed during the observation period. For these an unskilled labour climbed into the canopy to look for ants. Using this combination of techniques, quite small populations could be detected, trees/plants with ant nests were noted (Lokkers 1990). Identification of plant hosts were done at species level. Surveys were conducted from December 2019 - May 2020 at monthly intervals.

Weaver ant abundances were assessed by counting the number of weaver ant nests in each of the seven plant hosts viz, *Citrus acids*, *Pongamia pinnata*, *Mangifera indica*, *Azadirachta indica*, *Morinda citrifolia*, *Manilkara zopota* and *Hibiscus rosa sinensis* at Burgur, Mookandapalli, Kaveripattinam and Marandahalli of Krishnagiri district once at fortnightly intervals during December 2019 - May 2020. Counting the number of weaver ant nests takes approximately five min/ tree. Abiotic weather factors i.e., temperature, relative humidity, rainfall, rainy days, wind speed, gust, average wind speed, cloud, UV index were collected from the website https://www.worldweatheronline.com/krishnagiri-weather-averages/tamil nadu/in.aspx Pearson's correlation two tailed test were carried out between abiotic and biotic factors (Total number of nest in each month). All the statistical analysis were carried out in SPSS 16.0 software.

RESULTS AND DISCUSSION

Survey results on the colony inhabitation of *O. smaragdina* in different plant hosts are listed in Table 1. Twenty-seven under seventeen families viz*., Rutaceae,* Apocynaceae*,* Cucurbitaceae*,* Rubiaceae*,* Fabaceae*,* Anacardiaceae*,* Annonaceae*,* Ulmaceae*,* Meliaceae*,* Lecythidaceae*,* Moraceae*,* Myrtaceae*,* Malvaceae*,* Fabaceae*,* Caricaceae*,* Arecaceae*,* Sapotaceae were recorded for the presence of *O. smaragdina*. Colony inhabitation of *O. smaragdina* occurred in *Nerium oleander, Coccinia indica, Ixora coccinea, Mangifera indica, Haldina cordifolia, Polyalthia longifolia, Thespesia populnea, Cocos nucifera, Couroupita guianensis, Ficus religiosa, Psidium guajava, Hibiscus rosa sinensis, Ficus benghalensis, Prosopis juliflora, Acacia nilotica, Ficus carica, Annona squamosa, Carica papaya, Madhuca longifolia, Tamarindus indica* for six months. In *Pongamia pinnata* (March, April)*, Citrus limon* (March to May); *Holoptelea integrifolia* (December to February); *Azadirachta indica* (March to May) and *Manilkara zapota* (January to April); *Borassus flabellifer* (December to March) the months of occupancy of *O. smaragdina* were only for two, three and four months respectively and in *Morinda citrifolia* months of occupancy of *O. smaragdina* was only five months (January to May). Twenty-seven host plants under 17 families were recorded for the presence of *O. smaragdina.* Colony inhabitation of *O. smaragdina* occurred in 20 plant hosts for all the six months (December to May). Next highest occupancy was by *Morinda citrifolia* for five months during January to May. *Manilkara zapota and Borassus flabellifer* were occupied for four months. *Citrus limon*, *Holoptelea integrifolia*, *Azadirachtin indica* were occupied for three months. In *Pongamia pinnata*, *O. smaragdina* occupied only for the lowest number of period as two months during March and April (Table 1). *O. smaragdina* was present in twenty host plants for six months because of favorable climatic conditions, flowering and fruiting period.

Similar studies were conducted by Lim (2007) who reported that the habitat surveys found a total of 29 host plant species (21 families) for *O. smaragdina,*

Table 1. Colony inhabitation and abundance of *O. smaragdina* in plant hosts

Abundance

S. No.	Plant host	Family	Presence of *O. smaragdina*					
			December	January	February	March	April	May
1	*Citrus limon*	Rutaceae	-	-	-	+	+	+
2	*Nerium oleander*	Apocynaceae	+	+	+	+	+	+
3	*Coccinia indica*	Cucurbitaceae	+	+	+	+	+	+
4	*Ixora coccinea*	Rubiaceae	+	+	+	+	+	+
5	*Pongamia pinnata*	Fabaceae	-	-	-	+	+	-
6	*Mangifera indica*	Anacardiaceae	+	+	+	+	+	+
7	*Haldina cordifolia*	Rubiaceae	+	+	+	+	+	+
8	*Polyalthia longifolia*	Annonaceae	+	+	+	+	+	+
9	*Thespesia populnea*	Malvaceae	+	+	+	+	+	+
10	*Holoptelea integrifolia*	Ulmaceae	+	+	+	-	-	-
11	*Azadirachta indica*	Meliaceae	-	-	-	+	+	+
12	*Cocos nucifera*	Arecaceae	+	+	+	+	+	+
13	*Couroupita guianensis*	Lecythidaceae	+	+	+	+	+	+
14	*Ficus religiosa*	Moraceae	+	+	+	+	+	+
15	*Psidium guajava*	Myrtaceae	+	+	+	+	+	+
16	*Hibiscus rosa sinensis*	Malvaceae	+	+	+	+	+	+
17	*Ficus benghalensis*	Moraceae	+	+	+	+	+	+
18	*Morinda citrifolia*	Rubiaceae	-	+	+	+	+	+
19	*Prosopis juliflora*	Fabaceae	+	+	+	+	+	+
20	*Acacia nilotica*	Fabaceae	+	+	+	+	+	+
21	*Manilkara zapota*	Sapotaceae	-	+	+	+	+	-
22	*Ficus carica*	Moraceae	+	+	+	+	+	+
23	*Annona squamosa*	Annonaceae	+	+	+	+	+	+
24	*Carica papaya*	Caricaceae	+	+	+	+	+	+
25	*Borassus flabellifer*	Arecaceae	+	+	+	+	-	-
26	*Madhuca longifolia*	Sapotaceae	+	+	+	+	+	+
27	*Tamarindus indica*	Fabaceae	+	+	+	+	+	+

Abundance

Sl. No.	Plant host	Number of nests						Mean No of nests/ month± SD*
		December	January	February	March	April	May	
1	*Citrus limon* @	0.00	0.00	0.00	48.00	53.00	74.00	29.17±33.12
2	*Pongamia pinnata* #	0.00	0.00	0.00	44.00	49.00	0.00	15.50±24.06
3	*Mangifera indica* @	18.00	22.00	35.00	41.00	56.00	84.00	42.67±24.43
4	*Azadirachta indica* ¥	0.00	0.00	0.00	35.00	45.00	61.00	23.50±27.05
5	*Morinda citrifolia* ∞	0.00	5.00	6.00	9.00	12.00	16.00	8.00±5.62
6	*Manilkara zapota* ¥	0.00	15.00	18.00	24.00	35.00	0.00	15.33±13.71
7	*Hibiscus rosa sinensis* ∞	10.00	12.00	8.00	16.00	15.00	16.00	12.83±3.37
Total number of nests		28	54	67	217	265	251	

+: Presence of *O. smaragdina*; - Absence of *O. smaragdina;* *Mean of two counts; Mean values followed by standard deviation; @ - Count of seven trees; # - Count of eleven trees; ∞ - Count of six trees/shrubs; ¥ - Count of nine trees

Bambusa sp. (Poaceae), *Cocos nucifera* L. (Arecaceae), *Mimusops elengi* L. (Sapotaceae), *Samanea saman* (Jacq.) Merr. (Fabaceae), *Hevea brasiliensis* (Willd. Ex A.H.L. Jussieu) Müll. Arg. (Euphorbiaceae), *Khaya ivorensis* A. Chev. (Meliaceae), *Acacia auriculiformis* A. Cunn. Ex Benth. (Fabaceae), *Bruguiera gymnorhiza* (L.) Savigny (Rhizophoraceae), *Bruguiera parviflora* (Roxb.) Wight and Arn. Ex Griff. (Rhizophoraceae), *Bruguiera sp.* (Rhizophoraceae), *Canthium foetidum* Hiern. (Rubiaceae), *Derris trifoliata* Lour. (Fabaceae), *Morinda citrifolia* L. (Rubiaceae), *Sonneratia alba* Sm. (Lythraceae), *Talipariti tiliaceum* (L.) Fryxell (Malvaceae), *Vitex pinnata* L. (Lamiaceae), *Artocarpus heterophyllus* Lam. (Moraceae), *Averrhoa bilimbi* L. (Oxalidaceae), *Averrhoa carambola* L. (Oxalidaceae), *Barringtonia sp.* (Lecythidaceae), *Canarium megalanthum* Merr. (Burseraceae), *Citrus aurantifolia* (Christm.) Swingle (Rutaceae), *Cocos nucifera* L. (Arecaceae), *Garcinia mangostana* L. (Clusiaceae), *Lansium domesticum* Corrêa (Meliaceae), *Mangifera indica* L. (Anacardiaceae), *Nephellium lappaceum* L. (Sapindaceae), *Solanum torvum* Sw. (Solanaceae), *Syzygium samarangense* (Blume) Merr. and L. M. Perry (Myrtaceae).

According to Rodrguez-Giron et al. (2013) *O. smaragdina* ants were found visiting plants of 48 species in 32 families that were in bloom and attracting pollinators at the time of the observations. They saw ants monitoring blooms in 31 of the 48 plant species. Kenne et al., (2003) recorded that red weaver ants roost on a variety of plant species, including cultivated fruit trees like *Citrus maxima, Mangifera indica, Theobroma cacao, Garcinia mangostana, Lansium domesticum, and Syzygium aqueum*. These previous observations are similar to the present study. The red weaver ants erected their nests on 23 plant species in both rural and urban settings, with thirteen plant species (number of nests 2 - 10) in urban areas and twenty-two species (number of nests 5 - 15) in rural regions. The most nesting was observed on *Mangifera indica*, whereas the least number of nesting was observed on *Nerium odorum, Cocos nucifera L., Tamarindus indica*, and other host plants (Rajagopal et al., 2019).

Studies conducted to assess the abundance of *O. smaragdina* in different plant hosts are presented in Table 1. Numbers of nests were more in *Mangifera indica* (42.67), *Citrus limon* (29.17), *Azadirachta indica* (23.50) and less number of nests were found in *Pongamia pinnata* (15.50), *Manilkara zapota* (15.33), *Hibiscus rosa sinensis* (12.83) and *Morinda citrifolia* (8.00). The nest numbers increased from March (48) to May (74) in *Citrus limon*, March (44) to April (49) in *Pongamia pinnata*, December (18) to May (84) in *Mangifera indica,* March (35) to May (61) in *Azadirachta indica,* January (5) to May (16) in *Morinda citrifolia,* January (15) to April (35) *in Manilkara zapota.* The nest numbers followed fluctuating pattern from December (10) to May (16) in *Hibiscus rosa sinensis*. Numbers of nests were nil during December to February in *Citrus limon*; *Pongamia pinnata* (also during May); *Azadirachta indica, Morinda citrifolia* during December and *Manilkara zapota* during December and May.

Numbers of nests were highest in *Mangifera indica*, followed by *Citrus limon*, *Azadirachta indica*. Less number of nests were found in *Pongamia pinnata* and *Manilkara zapota*. Lowest number of nests were in *Morinda citrifolia* and *Hibiscus rosa sinensis*. The nest numbers increased from March to May in *Citrus limon*, March to April in *Pongamia pinnata*, December to May in *Mangifera indica,* March to May in *Azadirachta indica,* January to May in *Morinda citrifolia* and January to April *in Manilkara zapota.* The nest numbers followed fluctuating pattern from December to May in *Hibiscus rosa sinensis* due to homopteran population. Numbers of nests were nil during December to February in *Citrus limon* and *Pongamia pinnata* (also during May); *Azadirachta indica, Morinda citrifolia* during December and *Manilkara zapota* during December and May. The nest number dynamics clearly shown the lean trend during the dormant season of plant hosts. Similar observations were made by Lokkers (1990) who stated that the number of weaver ant nests (*O. smaragdina*) peaked during seasons of maximum physiological activity of the ant's host plants, i.e., during leaf and flower flush. The result is a high number of small nests during the flush and fruiting of host tree. Nest numbers were more during March to May in all the plant hosts due to new flush of leaves, flowers and less rain. This is confirmed by Mahapatro and Mathew (2016) whom stated that the nest number suffered during the plant host's lean period.

Several studies supported the present findings which reported that, the number of weaver ant nests per tree has often been used as a measure of ant abundance in plantation crops (Olotu et al., 2013). Nest numbers increased from October to December on cashew and from November to January on mango. These periods are the time when cashew and mango trees, respectively, produce leaf and flower flush in Benin. During this developmental stage of the host trees, ants produced numerous new small nests not necessarily because of increased ants numbers, but because they prefer to build new nests on young shoots with flexible leaves (Offenberg et al., 2006) and since flushing shoots are often infested with honeydew producing homopterans which the ants shelter by building nests around their colonies (Lokkers, 1986; Joachim Offenberg, unpublished data). Bharti and Silla (2011) stated that for five months, nests were seen on five citrus trees. It was discovered that there were a total of 20 nests at the beginning of the season and 40 nests at the conclusion. Per tree/ season, an average of 5-6 nests were constructed. Each nest was occupied for an average of eighty-five days before being abandoned when the majority of the leaves from which it was constructed perished. This is in accordance to the present study results.

Way (1954) and Vanderplank (1960), in Zanzibar abandoning of nests by *0. Longinoda* and their choice of sites for building new ones is also highly influenced by seasonal factors. Limited knowledge exists on the abundances of *O. Smaragdina* about cashew tree growth phases and weather conditions such as temperature, RH, rainfall etc. For *O. longinoda* that hunts by sight (Dejean, 1986), light intensity is a crucial factor, although other physical factors such as temperature and humidity play an important role in *O. spp* activities. At the same time, daily patterns of nest-building and nest-repairing activities of these ants remain so far relatively little known (Hemmingsen, 1973; Holldobler and Wilson, 1990). Such knowledge is crucial in maintaining high and stable populations of *O. Smaragdina* in the field (Rwegasira et al., 2014). Techniques for boosting ants' populations such as feeding (Nassor et al., 2015: Selvam et al., 2021) can be applied based on the knowledge of temporal abundances. Total number of nests were positively correlated with meterological factors like maximum temperature (r=0.95), minimum temperature (r=0.95), average temperature (r=0.96), maximum wind speed (kmph) (r=0.77), average gust (kmph) (r=0.54), average wind speed (kmph) (r=0.66) and UV Index (r=0.80) whether rainfall (mm) (r= -0.10), cloud (%) (r=-0.73), humidity (%) (r=- 0.92) were negatively correlated.

From the monthly data, if average mean temperatures (minimum 18 ^{0}C, average 27 ^{0}C, maximum 32 ^{0}C) where the key points to construct the nest in between these temperatures the (December 25 ^{0}C to May 37 ^{0}C) the nest number also gets increased from 28 to 251 (December to May). In most cases, a single married queen (haplometrosis) from the nest is responsible for colony reproduction in ants as well as the establishment of new nests; nevertheless, numerous cooperative queens may be engaged on rare occasions (pleometrosis). Pleometrosis is a condition that makes it easier for colonies to thrive under adverse conditions, although it is not always present (Peeters and Andersen, 1998). They are more common in the summer when the temperature exceeds 39 °C. As a result, 25 °C to 36 °C was the optimal significant range for nest building and ant abundance (Fig. 1). Similarly, Devarajan (2016) indicated that temperature around the nest and wind intensity revealed as critical environmental variables for influencing *Oecophylla smaragdina* nest configuration. Outside the nest, ant activity remained unbroken throughout the day (24 hr), with substantial variation across day time intervals. Activity was lowest at night (11:30 PM to 4:30 AM), then increased significantly in the early morning (5:30 AM to 8:30 AM), then increased again (9:30 AM to 11:30 AM) to reach a noon high. Early in the afternoon, the day's activity reaches saturation (12:30 PM to 2:30 PM). Activity was reasonably continuous from midday to late afternoon (9:30 AM to 6:30 PM time period), with foraging, nest production, egg, larva, and pupa transfer movements

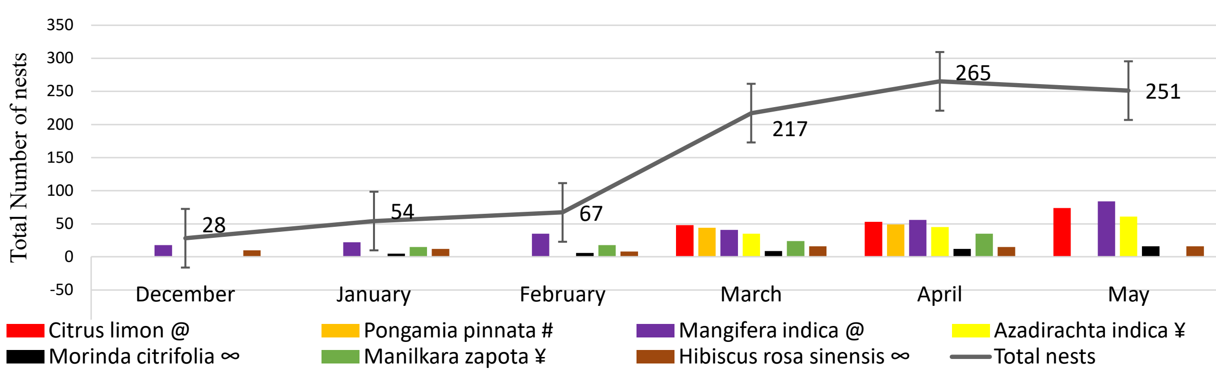

Fig. 1. Abundance of *Oecophylla smaragdina* on plant hosts

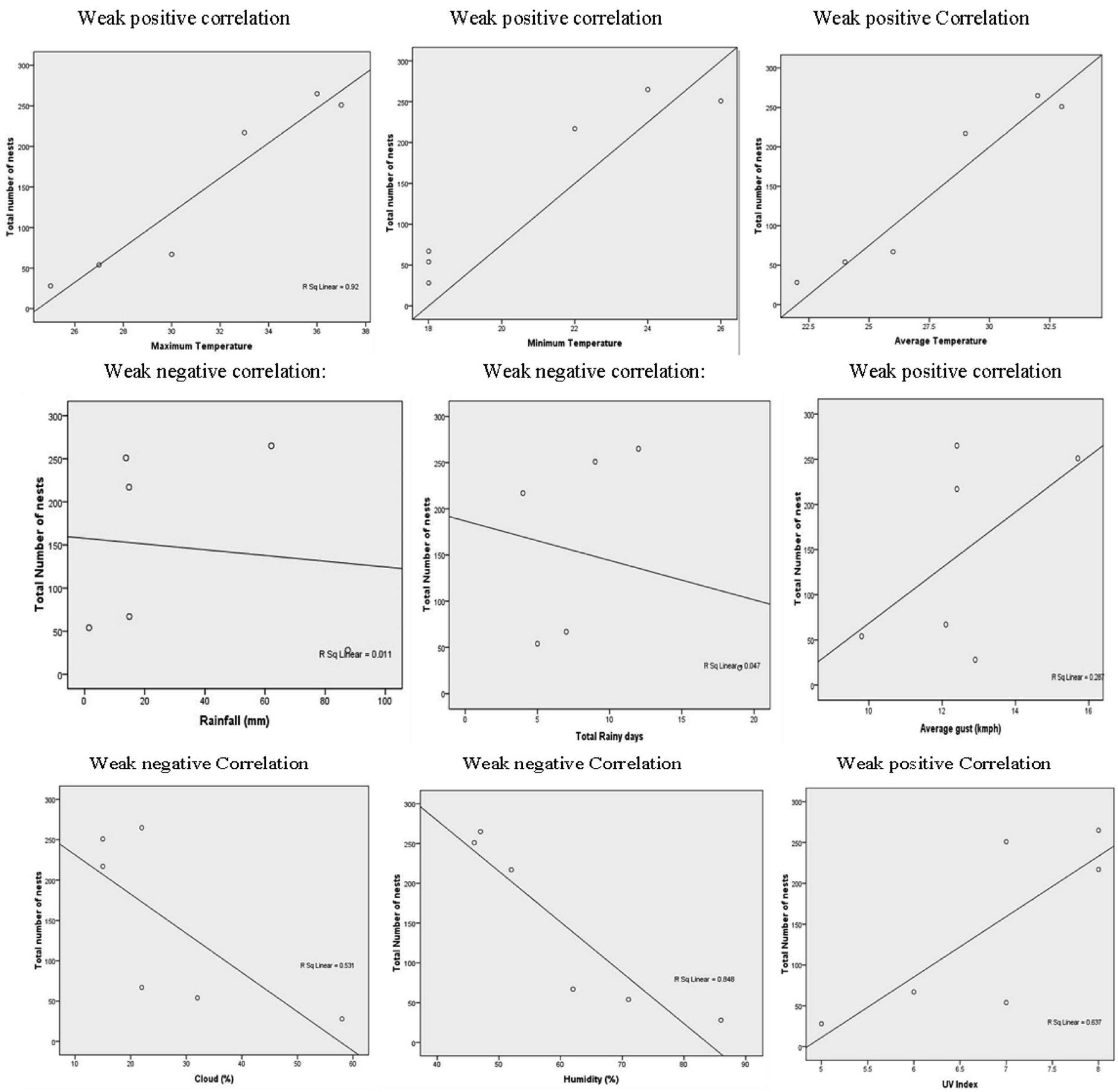

Fig. 2. Relationship weather factors vs nest of *Oecophylla*

by worker ants participating in active movements, followed by a quick nighttime decline (7:30 PM to 10:30 PM). Temperature and relative humidity are important abiotic elements that influence the feeding behaviours of various ant species. Ants can be classified as diurnal (active during the day), nocturnal (active at night), or crepuscular (active at both dusk and dawn) based on their daily foraging routines (Pimid et al., 2019).

Temperature has been correlated to activity by many ant species (e.g. *Veromessor pergandei* Meyr and *Pogonomyrmex californicus* (Buckley): Bernstein, 1979; *O. smaragdina*: Lokkers, 1990). Similarly, Jean-François vayssieres (2011) reported that *O. Longinoda* are more abundant in the mid-day, early and late afternoon periods – when temperature is higher and relative humidity (RH) lower. They are less abundant in the evening, night and early morning. RH is also higher at these times and temperature is also lower. Correlation analysis supports the finding that temperature is a very important abiotic factor for weaver ants. Ant activity outside the nest was positively correlated with temperature ($r = 0.50$, $n = 896$, $p < 0.0001$) and negatively with RH ($r = -0.18$, $n = 896$, $p < 0.0001$). Sangma and Prasad (2021) investigation in the Ri-Bhoi area of Meghalaya found similar results that the weaver ants, *O. smaragdina* are prevalent great numbers in hot and humid environment with 22 -30°C. Weaver ants generally thrive in warm and humid climatic conditions with an average temperature of 20-30 °C (Crozier et al., 2010; Bharti and Silla, 2011). They are found in almost all kinds of trees with moderate to large-sized leaves, which are easier to pull and provide good shelter for nesting. In the Ri-Bhoi district of Meghalaya, the temperature range of 18-32 °C.

Other factors like rainfall (mm) (r= -0.10), rainy days (r= -0.22), cloud (percent) (r=-0.73), and humidity (percent) (r=-0.92) were all negatively correlated with nest formation, implying that nest formation should be completed before the monsoon changes or during the active forage season, when the circardian rhythm plays an important role in nest formation prior to monsoonal rainfall (Fig. 1). The daily foraging pattern is the daily routine of ants within 24 hr, such as foragers finding foods outside their nests and returning the food to their colonies, whereas the seasonal foraging pattern indicates the reaction to seasonal change, such as winter, summer and rainy. Different biotic and abiotic variables influence both daily and seasonal foraging activity in ants (Patel and Bhatt, 2020; Selvam et al., 2022). In fact, there is a negative association with these four factors. With these factors in mind, and despite the low temperature on rainy days and low cloudy days, as well as the high humidity at night during periods of lunar presence, ant densities were not significantly different from sunny days, whereas the adundance level and all activity of workers prior to maintaining the nest optimum condition inside and outside the nest, if any one factor is not applicable, the nest queen absconds to a suitable location and the abundance transfers. As a result, a variety of elements interact to influence the weaver ant's internal clock.

Abiotic factors such as temperature, rainfall and relative humidity (RH) can also affect weaver ant abundances; similarly, weaver ant’s queen might die under heavy rainfall (Peng et al., 2008). Weaver ant, *O. smaragdina*, prefers temperatures between 26°C and 34°C and an RH between 62% and 92% (Van Mele and Cuc, 2007), the extremes of which are detrimental. Peng et al. (2008) observed reduced populations of weaver ants under harsh conditions including high rainfall. Lokkers (1990) reported a negative brood development of below 21°C and above 34°C. In the current study, RH ranged from 45% to 84%, which was lower than that from 62% to 92%, which was reported to be optimal for *O. smaragdina* (Van Mele and Cuc, 2007). Average gust (kmph) (r=0.54), maximum wind speed (kmph) (r=0.77), average wind speed (kmph) (r=0.66), In field observations, all of these wind parameters were positively connected with nest construction (Fig. 1) Wind characteristics had no impact on ant activity and nest formation because workers of *O. smargdina* have well-developed aralia on their feet. Survey records that the part of the host selected for nest-building varied according to the months, and that the variation seemed to be correlated with the wind direction.

The monsoons do not change direction until late in September and June each year, yet *Oecophylla* move from one side of the tree to the other in late October and early November each year, before the change in direction of the monsoon. This would indicate that the deciding factor is the position of the sun and not the prevailing wind, unless the ants move in anticipation of the change in wind direction. Nests are usually constructed in positions well exposed to the sun and not in the shade. As stated above, the complete colony will suddenly move to a new location before the rainy days. Likewise, intolerable and unsuitable abiotic factors, Way (1954) also states that the complete colony will suddenly move to a new location if heavily infested with predators. Of 165 colonies observed for 3 years nesting in a block of 500 palms, eleven (6.6%) died out and seven (40%) moved to other palms. application of some insecticides caused increased movement. How they withstand the strong wind effects or gust means which slightly hinders host position and movements means because of their huge aralia and their adhesive characteristics, a single worker from *0. Smargdina* grasp the usual surface in any poor weather or other variables described above. Aralia are crucial not just for retaining the substrate, but also for capturing and transporting huge prey (Wojtusiak et al., 1995).

This occurrence of the aralia on ant feet has been surveyed in a large number of ant species by Freeland et al., (1982). In the subfamily Formicinae, the aralia have been found by these authors in all three surveyed species: *Camponotus discors*, *Paratrechina* sp. and *Melophorus sp.* As far as we know, until now the presence of aralia has not been documented in ants of the genus *Oecophylla.* A study found that temperature has a significant link with colony inhibition and nest number. Rainfall, rainy days, cloud percentage and relative humidity all substantially reduce the colony's composition. The ant colony does not appear to be influenced by the maximum wind speed, average gust, or UV Index.

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AUTHOR CONTRIBUTION STATEMENT

SK performed the idea of this article and wrote the manuscript. SK and TN provided the materials with guidance to conduct the experiment. SK written and correcting the article. Hence all authors equally contributed towards the experiments. The authors read and approved the final manuscript.

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