



Emergence, entry and guarding behaviour at the nest-opening site of the yellow crazy ant *Anoplolepis gracilipes* (Jerdon)

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Abstract

The yellow crazy ant *Anoplolepis gracilipes* is a notorious invasive animal species causing serious problems in the areas where it has been introduced so far. Accordingly various attempts have been made to collect biological information to manage the said ant species. Recently, we had the opportunity to study the behavioural events in respect to emergence from the nest, entering the nest as well as guarding the nest –hole in *A. gracilipes* occurring in the Achhruram Memorial College campus, Purulia, West Bengal, India. It is revealed that these ants are habituated to go out of the nest on average 13.92 ± 1.12 SE, entering the nest 10.9 ± 0.75 SE and guarding the nest –hole 12.73 ± 1.16 SE (N=85) per minute during day hours. While such numbers differed significantly ($p < 0.05$) with respect to behavioural events considered for studies, no significant difference could be established in respect to seasons ($p < 0.06$). Thus the present findings suggest that, being invasive species *A. gracilipes* have developed various devices to protect them from the attack of endemic species on way of exploiting the endemic species.

Keywords: *Anoplolepis gracilipes* ants, emergence, entry, nest guarding

Introduction

The yellow crazy ant *Anoplolepis gracilipes* is one of the notable invasive animal species as could be revealed from the listed one hundred species presented by Lowe *et al* (2004) [10]. The said ant species is a native of the moist tropical lowlands of Southeast Asia and adjacent islands of the Indian and Pacific oceans (Guénard, 2019) [4]. However, nowadays, these ants are creating problems as invasive agents in certain parts of Australia, New Zealand, Chile, Durban, South Africa, Zayul, Tibet, Mexico, as well as in the Caribbean, Central and South America (Küchler, 1964, Lester and Tavite, 2004, Wettre, 2005) [7, 9]. Almost in all regions *A. gracilipes* are causing serious problems on way of threatening the endemic species of the introduced localities and they are very much involved in biodiversity degradation. (O' Dowd *et al.* 2003, Lester and Tavite, 2004, Drescher *et al.* 2007, Plentovich *et al.* 2018) [14, 9, 3, 15].

Following invasion and with the development of subsequent environmental hazards various workers have paid due attention to note the biology and inter-specific interactions of *A. gracilipes* in respect to the ecosystem where these ants became serious nuisance (Lester and Tavite, 2004, Abbott, 2005, Drescher *et al.* 2007, Kaiser - Bunbury *et al.* 2014, Lee *et al.* 2017, Plentovich *et al.* 2018) [9, 1, 3, 5, 8, 15]. However, still to date no attention has been paid by any worker to note the behaviour of these ants in respect to emergence from the nest, entry into the nest from the outside and guarding strategy encircling the opening of the nest. Thus, in course of our studies on the bioecology of ants occurring in and around Jhalda (Achhruram Memorial College premises), Purulia, West Bengal, India we took the liberty to note these behavioural events during the period of day hours at an interval of 1 hour, and the findings are worth reporting.

Materials and Methods

The nest we considered for our studies was located on the ground but very close to a big *Albizia lebbbeck* tree. The ants were seen to come out of the nest through a hole as well as entering into the nest through the said hole of and on, while certain individuals were seen to roam encircling the nest hole all along. We spent 1 minute in each occasion during any time in an hour between 06.00 h and 18.00 h at random during the period of September 6, 2008 and December 23, 2014. The data collected during an hour period were considered to calculate the mean and standard error values. Also two-way ANOVA was applied to justify the effect of the hours of the day in respect to the strategies developed by the ants regarding the frequency of emergence from the nest and entry into the nest keeping the number of ant individuals engaged in guarding the nest-hole in view.

Results

During the period of six years, we recorded data on 85 days, irrespective of seasons, at random, on the frequency of emergence from the nest, entry into the nest as well as the numbers of *A. gracilipes* were guarding the nest-hole. The behavioural variations in respect to these events have been shown in Figs. 1-12. Irrespective of study hours 1-64 (12.73 ± 1.16 SE) ant individuals kept them engaged in nest guarding, 0-33 (10.9 ± 0.75 SE) were entering the nest, and 1-59 (13.92 ± 1.12 SE) were emerging out of the nest. Results of ANOVA tests clearly indicate that the number of ant individuals took part in executing the behavioural events like emergence from the nest, entering the nest and guarding the nest –hole differed significantly ($p < 0.05$) throughout while such numbers irrespective of seasons did not differ significantly ($p < 0.06$).

Explanation of Figures

Figs. 1-12 represent the mean (\pm SE) number of ants noted guarding the nest-hole (S), entering the nest (I) and

emerging out of the nest (O) during one minute time period between 06:00 h and 07:00 h

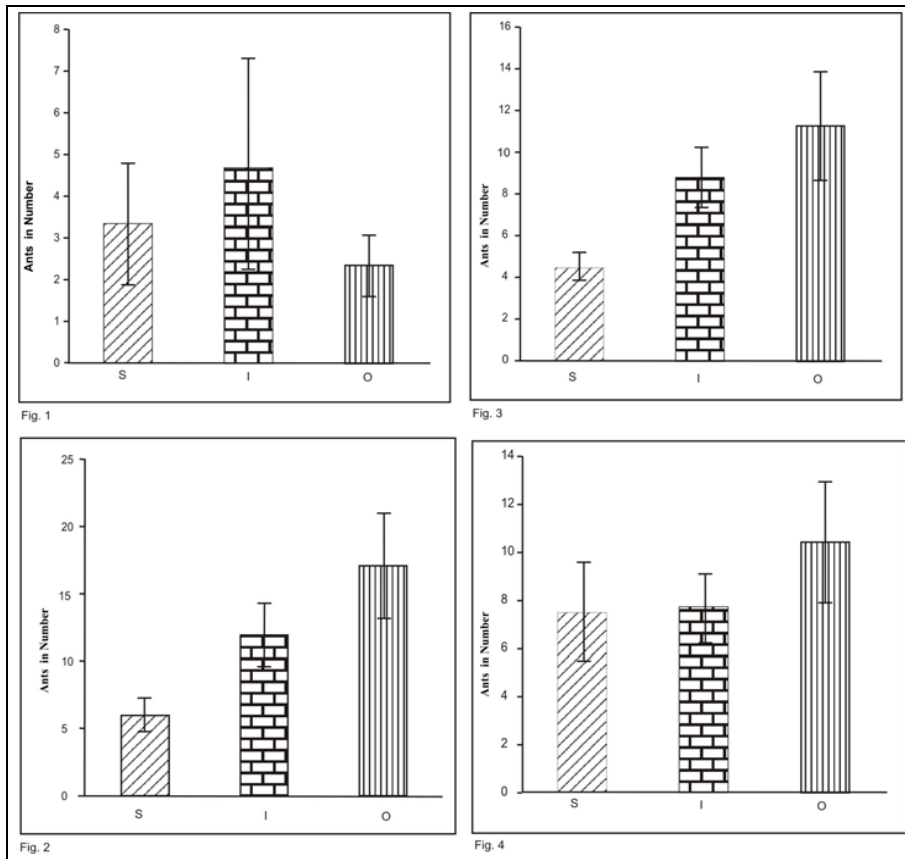


Fig 1: 07:00 h and 08:00 h (Fig.2), 08:00 h and 09:00 h (Fig.3), 09:00 h and 10:00 h (Fig.4), 10:00 h and 11:00 h

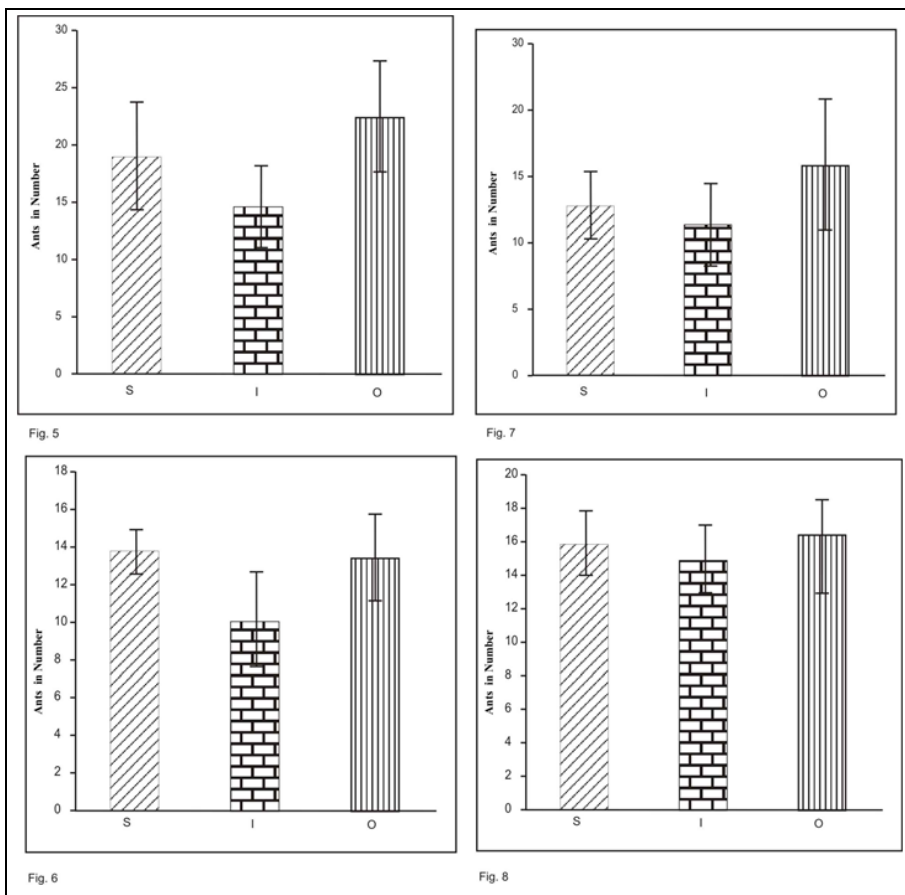


Fig 5: 11:00 h and 12:00 h (Fig.6), 12:00 h and 13:00 h (Fig.7), 13:00 h and 14:00 h (Fig.8), 14:00 h and 15:00 h

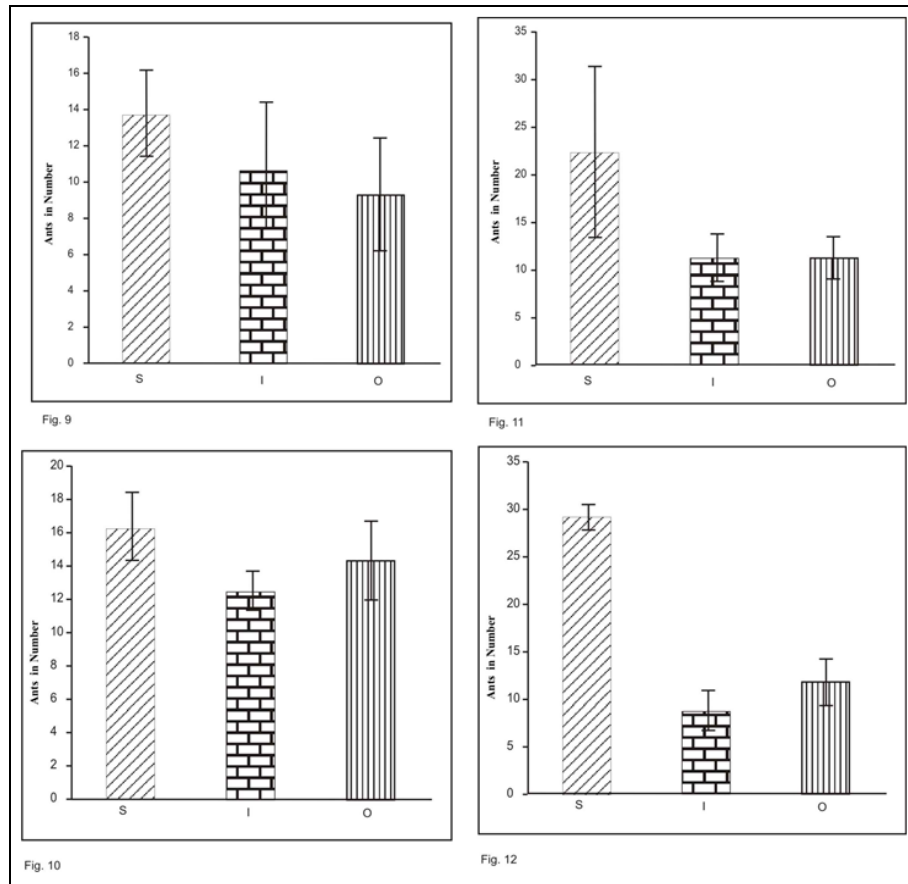


Fig 9: (Fig.9), 15:00 h and 16:00 h (Fig. 10), 16:00 h and 17:00 h (Fig. 11), 17:00 h and 18:00 h (Fig.12).

Discussion

From the results it is clear that the yellow crazy ants *A. gracilipes* are habituated to maintain a strategy for effective foraging efforts at least in respect to the hours of the day time. Though it is customary that the foragers go out of the nest from time to time and also entry of the individuals is continued simultaneously the occurrence of certain number of individuals encircling the opening of the nest is undoubtedly, a matter of interest. *A. gracilipes* ants have been listed as one of the world's most invasive alien species (Lowe. *et al.* 2004) [10]. It is reported that *A. gracilipes* are apt to establish them in a new geographical area because of traits such as aggression toward other ant species, little aggression toward members of their own species (Kirschenbaum and Grace 2008) [6]. These ants get much of their food requirements from scale insects, aphids and other Sternorrhyncha. Also, they get their carbohydrates from plant nectar. Since report on the food storage of these ants is not on record, it is, at this moment very difficult to explain why certain members remain engaged at the nest-door as guards. It may assume that, there exists possibility of robbing food from the nest by other ant species or by the members of the same species belong to the other nest-colony.

Food-snatching, robbing of the food materials from the nest as well as cleptobiosis habits have been observed in the ants *Pheidole roberti*, *Paratrechina longicornis*, *Oecophylla smaragdina*, *Tetraponera rufonigra*, *Messor aciculatus*, *Prenolepis imparis*, *Ectatomma recidumand*, and *Messor capitatus* (Lynch *et al.*, 1980, Yamaguchi, 1995, Breed *et al.*, 2012, Naskar and Raut 2019) [11, 17, 2, 12]. Also, in respect to such behavioural events fighting between the owner and snatcher ants have been noted in some ant species (Naskar

and Raut 2020) [13]. Thus, it is most likely that, *A. gracilipes*, being an invasive species creates different kinds of conflicts at least with endemic ones to establish their aggressive and dominant habit so as to keep the victimized ant species under fear psychosis. This sort of behaviour may force the endemic species for retaliation, if possible unitedly. Perhaps, anticipating such an attack *A. gracilipes* left no effective strategy to protect them and to establish them in a new area successfully.

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