

# **Studies on the Distribution of *Pachycondyla sennaarensis* (Hymenoptera: Formicidae: Ponerinae) in Saudi Arabia. 1. Ar- Riyadh Region\***

**Mohammed Saleh Al-Khalifa\*\***, **Ashraf Mohamed Ahmed\*\*\***, **Ashraf Mohamed Ali  
Mashaly\*\*\***, **Fahad Abdu Al-Mekhalfi**, **Galila Khalil**, **Mohammed Iqbal Siddiqui** and  
**Mahmoud Fadl Ali\*\*\***

*Department of Zoology, College of Science, P.O. Box 2455, King Saud University, Riyadh 11451,  
Kingdom of Saudi Arabia*

**Abstract.-** In Ar-Riyadh Region in the Kingdom of Saudi Arabia (KSA), the Governorates of Al-Zulfi, Al-Ghat and Al-Majmah (north zone), of Al-Hariq, Al-Aflaj and Hawtat Bani Tamim (south zone), of Hijrat Sa`ad (east zone), of Shaqra, Durma, Al-Qasab, Huraimela`a (west zone) and Riyadh City (central zone) were surveyed for the presence of *Pachycondyla sennaarensis* monthly during the period from December 2007 to December 2009. The ant was not detected in Al-Majmah or Al-Zulfi. It was detected in Al-Ghat and Hijrat Sa'ad only in 2009, while it was found in small numbers in 2008 and in large numbers in 2009 in all west zone Governorates; which suggest that the ant was actively spreading in these localities. Large numbers of the ant were detected in the south and central zones' Governorates during both years. The positive localities were infested more heavily during spring and summer. The ants seemed to have adapted to the hot and dry weather of Riyadh Region especially in spring and summer by establishing the nests in moist sand in irrigated gardens, parks, housing areas and roadside plantations. This ant is a condemned health hazard and more field studies and quarantine measures are essential for its control.

**Keywords:** Hazardous insect, medical hexapoda, samsun ant, *Pachycondyla sennaarensis*.

## INTRODUCTION

*Pachycondyla sennaarensis* was first described as *Ponera sennaarensis* by Mayr in 1862. The type locality was Sennar in Sudan. Wheeler (1922) found it in many localities in West Africa [as *Euponera (Brachyponera) sennaarensis*]. Levieux and Diomande (1978) described it as the most common ant in the savannah regions in Sudan, being found also across the Sub-Saharan Africa to Somalia and up to the southern edge of the Sahara in Niger, north of Niamey. Taylor (2005) reported it to be present in Senegal, Guinea, Ethiopia, Congo, Zaire, Nigeria and Cameroon. In Iran, Tirgari and Paknia (2005) reported it from Lar County and Akbarzadeh *et al.* (2006) recorded it from Iranshahr

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\*\* Corresponding author: mkhalifa@ksu.edu.sa

\*\*\* Permanent Address: Zoology Department, College of Science, Minia University, Egypt

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County while Paknia (2006) reported that it has spread also into the southern provinces of Sistan-Baluchestan, Kerman, Fars, Hormozgan and Bushehr.

*Pachycondyla sennaarensis*, known as samsam ant, was reported from the Kingdom of Saudi Arabia (KSA) in 1985 (Collingwood, 1985). Later, it was reported from

Kuwait, Oman, Yemen (Collingwood and Agosti, 1996) and the United Arab Emirates (Collingwood *et al.*, 1997) as an aggressive ant with a painful sting, and as a scavenger feeding on food refuse and arthropods, as well as raiding bee hives and destroying honey bees (Whitcombe, 1982). In the latter country, it became a recognized public health hazard since its sting has resulted in a few cases of fatal anaphylactic shock (Dib *et al.*, 1992, 1995). A case of anaphylactic shock has been also reported in KSA (Al-Shahwan *et al.*, 2006). Also, several Saudi anaphylactic cases following samsum ant stings reported to local clinics, some of them were critical (Al-Anazi *et al.*, 2009). Therefore, it became necessary to investigate the degree of distribution of this ant in KSA. In the present study, we began this task by investigating the distribution of this ant in Ar-Riyadh Region. M.S. AL-KHALIFA *ET AL.*

## MATERIALS AND METHODS

### *Survey areas and periods*

A survey of the ant *P. sennaarensis* was undertaken during the period from December 2007 to December 2009 in Al-Riyadh Region. Surveys were performed twice monthly in winter (December, January and February), spring (March, April and May), summer (June, July and August) and autumn (September, October and November). Ar-Riyadh Region was subdivided into east, west, north, south and central zones as illustrated in the map in Figure 1. The north zone included the Governorates of Al-Zulfi (26° 15' N, 45° 00' E), Al-Ghat (25° 34' N, 45° 37' E), Al-Majmah (25° 52' N, 45° 57' E), the south zone included the Governorates of Al-Hariq (23° 53' N, 45° 35' E), Al-Aflaj (22° 00' N, 46° 21' E) and Hawtat Bani Tamim (23° 12' N, 45° 11' E), the east zone included Hijrat Sa`ad (25° 10' N, 47° 58' E), the west zone included the Governorates of Shaqra (25° 34' N, 45° 23' E), Durma (24° 00' N, 45° 55' E), Al-Qasab (25° 13' N, 45° 32' E), Huraimela`a (24° 43' N, 45° 46' E), and the central zone included Riyadh City (24° 30' N, 46° 00' E). Search for samples were made in these urban areas in streets, houses, hospitals, irrigated parks, gardens and farms as well as from the surrounding semidesert areas.

Fig. 1. Map of the Kingdom of Saudi Arabia illustrating the urban centers surveyed for *Pachycondyla sennaarensis* in Ar-Riyadh Region (blanked area) with inset showing the Searches were conducted during the twilight period before sunset and dawn before sunrise by using flash lights for illumination. Searches consisted of scanning the ground and turning stones to find

colonies and forager workers. Forager and stationary specimens were collected directly using featherweight forceps or an aspirator and held in separate vials. Each specimen was labeled with date and time of collection and locality.

### *Colony sampling*

#### Ant coloni

identified and counted. Colony collection for determination of caste types and numbers was performed by digging at a distance of 30-50cm around the orifice(s) of the nest to a depth of 50-100cm and lifting the whole earth mass into a cloth bag to the laboratory. To determine the type and number of the different castes, each earth mass containing a colony was spread out in a large tray, the rim of which was covered with petroleum jell. The whole earth mass was carefully examined and each caste type was placed in a separate jar. Pictures of the different castes and their morphological characteristics were prepared using a scanning electron microscope (SEM, Jeol, Model: 6380 LA).

### *Sorting ant specimens for identification*

The specimens collected from the localities were usually contained in bags, jars or vials, according to the sample size, mixed with miscellaneous matter. In the laboratory, the field specimens were spread out in Petri dishes, ethyl alcohol was added and the ant samples were manually removed from other materials with the aid of a stereoscopic microscope using watchmaker or a featherweight forceps. The samples were identified using the keys of

Collingwood (1985) and Collingwood and Agosti (1996). Three to ten dry specimens from each morphospecies were mounted and stored properly to document the geographic record. A few individuals of workers of each morphospecies were preserved in 70% ethyl alcohol in small specimen vials and sent to Dr. Collingwood at the Leeds Museum in Great Britain for confirmation of identification. surveyed locations. nducted during daylight and es in each defined area were different DISTRIBUTION OF SAMSUM ANT IN SAUDI ARABIA 709

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temperature, relative humidity and rainfall in the study areas were obtained from the Hydrology Division, Ministry of Water and Electricity, Riyadh, Saudi Arabia (the annual reports of 2008 and 2009).

was always present in moist soil in irrigated areas. The nest entrance to the colony was usually circular, 10-20mm in diameter, and was surrounded with piled-up debris resulting from nest excavations (Fig. 2). The number of nest entrances ranged between two and five in hard soil and between three and ten in soft soil.

*sennaarensis* nests (A) in hard soil (B) in soft soil.

In summer and autumn, forager surface activities began 1h before sunrise and continued for several hours coming to complete halt as the temperature rose at noon time. A second period of activities began 1-2h before sunset and continued to midnight, especially when there were artificial lights. In the cold winter season, outside activities began after sunrise and continued until 2h before sunset. The winged females were 8-9mm in

with a black body, reddish brown mouthparts and legs and pale yellowish wings (Fig. 3A). The female terminalia was characterized by the presence of a rudimentary sting (Fig. 3B). The smaller winged males were 6-8mm in length and were black in color with brownish yellow mouthparts and deep red-brown legs (Fig. 4A). The male terminalia was characterized by the presence of a copulatory apparatus (Fig. 4B). The



workers were 6-6mm in length; workers from different colonies showed variation in size. The workers had a black body, deep red-brown appendages (Fig. 5A) and their terminalia was characterized by the presence of a prominent sting (Fig. 5A,B). The larvae found in the nests were white in color and varied in size according to stage, measuring 1.9-3.2 mm in length (Fig. 6). They were found in large numbers together with pupae in the damp soil of the nests. The pupae were white in color, found inside orange-colored cocoons (Fig. 7) and measured 4.45mm in length. Eggs were not found in the nest soils.

female *Pachycondyla sennaarensis* (A) lateral view, (B) ventral view of abdomen showing sting (arrow).

m*Pachycondyla sennaarensis* (A) lateral view, (B) ventral view of abdomen showing copulatory apparatus (arrow).

specimens included *Tapinoma simrothi* Krausse, 1911, *Monomorium niloticum* Emery, 1881, *M. mayri* Forel, 1902 and *Messor meridionalis* (Andre, 1883).

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The wealimatic parameters changes in air and soil mpe **RESULTS** *Pachycondyla sennaarensis* nests were Fig. 2. Entrances of *Pachycondyla* In warm seasons, particularly in spring, m length Fig. 3. Scanning electron micrograph of Fig. 4. Scanning Electron Micrograph of ale Other ant species present in the collected *urvey results* ther data in the five zones during the M.S. AL-KHALIFA ET AL. 710

years 2008 and 2009 are illustrated in Tables I-V.

Fig. 5. Scanning electron micrograph of *Pachycondyla sennaarensis* worker (A) lateral view, (B) abdomen showing prominent sting.

Fig. 6. Photomicrograph of different stages of *Pachycondyla sennaarensis* larvae.

*North zone of Riyadh*

In Majmah Governorate, the following places were surveyed: the farms of Al-A`awajiya, Um-Hazeb, Al-Jaw, Fahd Al-Madlaj and Mohammad Al-Aman as well as a deserted historical city. Wheat and palm trees were cultivated in these farms. In Al-Zulfi Governorate, several streets downtown in Al-Zulfi city and a central square in Alaqa Village were surveyed. The farms of Abdul-Aziz and Saud Al-Farraj, of Al-Shamaliya in Shamaliyat Jalajil and of Abu Dakhil Sulaiman were surveyed; palm trees and vegetables were present in these farms. The public garden in Hawtat Al-Sudayr containing ornamental shrubs and children play area and a square in Al-Quds district were also surveyed. No ants were found during any of the four seasons throughout both years in Majmah and Al-Zulfi Governorates.

Fig. 7. Photomicrograph of different stages of *Pachycondyla sennaarensis* pupae and their cocoons.

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