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**RESEARCH ARTICLE**

# First Record of *Solenopsis aurea Wheeler* (Hymenoptera: Formicidea) From India in Maharashtra

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## *Abstract*

This species of fire ant, collected from Buldana district in River Purna plain is described and illustrated based on worker under the name *Solenopsis aurea wheeler*. Presence of keel like toothbeneath petiole which directingbackward, is its distinguishing character differing it from *Solenopsis geminate* that distributed in India and other fire ants which found globally. *Solenopsis* is a small genus of subfamily myrmicinea belonging to tribe Solenopsidini. From the genus *Solenopsis*, the species *Solenopsis aurea* is here described from India for the first time.



## INTRODUCTION

Ants are one of the great success stories in the history of life on Earth. Ants are considered as one of the most diverse, abundant and ecologically significant organisms on earth. Ants, prominent invertebrate group used in assessing ecological responses are one of nine proposed indicators (Underwood and Fisher, 2006). Ants are abundant insects and are considered important in ecosystem functioning. They have diverse ecological roles, including nutrient cycling, seed dispersal and population regulation of other insects (Holldobler and Wilson 1990; Folgarait 1998).

Ants play an important role within the terrestrial ecosystems because they have numerous interactions with different plant species, including seed dispersers, leaf- and seed- predators, and in some cases, as pollinators (Vázquez 1998; Hernández 2005).

Living ants are currently classified into 21 subfamilies and 283 genera (after Bolton 2003). Barry Bolton, (2012) have suggested 15201 species (family-Formicidae) of ants in Bolton World Catalog.

Indian Ant Fauna, represent diversity, includes 12 known subfamilies like; Aenictinae, Amblyoponinae, Cerapachyinae, Dolichoderinae, Dorylinae, Ectatomminae, Formicinae, Leptanillinae, Myrmicinae, Ponerinae, Proceratiinae and Pseudomyrmecinae. All over the world there are 22 known subfamilies of ants. The current species list includes approximately 652 species from 87 genera and will continue to increase in number as researchers begin to explore systematically the diverse habitats of ants across the region.

In India, a few reports on ant ecology and diversity exist. Bingham (1903) reported 443 species of ants from India, which comes under 5 subfamilies and 79 genera. His "Fauna of British India" – Hymenoptera includes descriptions of all the species, which were then available in various scattered publications. Gadagkar *et al.*, (1993) have sampled ants in some selected localities in Western Ghats. Kumar *et al.*, (1997) reported the ant fauna from some areas of Bangalore City. Recently a list of 591 species of ants in India was released (Tiwari*et al.*, 1998). HimendarBharti sampled new species of ants in Himalaya.

*Solenopsis* is a small genus of subfamily myrmicinea belonging to tribe Solenopsidini.A new species, *Solenopsis aurea* is here described from India for the first time. Prior to this the genus *Solenopsis* was represented

by only one species from India, *Solenopsis geminata* (Bharti 2011), which is found commonly in India. It is also recorded in *Checklist of Indian Ant* by Indian Institute of Science, Bangalore. With this species now a new species of genus *Solenopsis* have been found with its first appearance and first record. It will add new species in myrmecology literatureof ants in India.

Early taxonomic works on the genus are by Fabricius (1804), Wheeler (1906), Snelling (1963), Hung et al (1975) and Santschi (1910). A technical identification key to all species of fire ants in North and South America was published by J.C. Trager in 1991 (*Journal of the New York Entomological Society* 99 (2): 141-198). A very useful older work that includes numerous scanning electron pictures was publishedby A. Hung, M.R. Barlin, and S.B. Vinson in 1977 (*Texas Agricultural Experiment StationBulletin* No. 1185). An updated, more detailed identification guide is being prepared by JerryCook, who is also studying specimens around Corpus Christi, Texas (Jerry., et al 2002).

## I. Materials and Methods

### A. Study area

Buldhana, the western most district of the Vidarbha or the Amaravati division of the state of Maharashtra, lies between $19^0$51' and $21^0$17' n. Latitude and $75^0$57' and $76^0$59' e. Longitude.

Topographically, the district falls under three structural-*cum*-physical units: a narrow, northern strip in the Jalgaonthasil in the Satpuda hills, the Payanghat or the Purna plains in the middle comprising the tahsils of Malkapur, Khamgaon and Jalgaon (Jamod) and the Buldhana plateau comprising the Chikhli and Mehakartahsil to the south. The landscape in the district is rich and varied, with gently sloping fertile riverine plains. Under this district, the tehsil Jalgaon (Jamod) lies in beween the River Purna and foot of Mountain Satpuda.

Out of the two main rivers of the district are the Penganga and the Purna,the River Purna is the only perennial stream in the Payanghat plains, rises in the south facing scarps of Gawilgarh hills in the district of Amravati. It flows across the northern part of this district to join the Tapi in Jalgaon district.

The Purna plains or the Payanghat is the main low land region of the district average elevation of which ranges between 250 and 270 metres. The slope is extremely gentle, towards the west. On an average, it is about 50 to 60 km broad. It is bounded to the north by the Satpuda scarps and to the south by the Ajanta scarp. The valley floor of Purna is alluvium in filled.

The Purna River runs west, skirting the Satpudas, flowing within a distance of 20 km from the scarp edge as a result of which the older alluvium of the Purna is thickest in the southern parts of Jalgaon.

The Purna (Payanghat) plains fall into further sub-divisions:—

(i) The Satpuda piedmont in Jalgaon tahsil, an elongated east-west strip, 4 to 10 km in width;

(ii) The older alluvium of the Purna valley, thicker and wider to the north or the right bank of the river that is 8 to 15 km in width. This alluvial belt narrows down southwards on the left bank. This area lies entirely below 270 m above sea.

(iii) A regional of residual and erosional topography between 300 m and 400 m above mean sea level with steeper gradients than to the north leading to the northern scarp edge of the Ajanta range.

Natural vegetation over these piedmont soils is well dispersed, with almost pure stands of *anjan* and *neem* along the stream courses. Kharif jowar, peas and other pulses and cotton are the main crops. This plain is formed of pure black soil, called *regur*, forming the black belt. During flooding river bring much soil, which is more healthy for crop (Central Provinces District Gazetteers -Buldana).

The present study was carried out in an attempt to understand and measure the status of ant diversity in selected Agricultural areas. Study sites were selected from second sub-division of plain described above in Jalgaon

tahsil. Three agricultural sites were selected around three locations viz., near edge of River Purna, Cultivated land between village Tiwadi (Ajampur) and Pimpalgaon (Kale), and agricultural area around village Mahasiddha Dhanora. Villages are evenly distributed at distances of 3 km from each other. All these location come under Jalgaon tehsil of Buldana district.

**B. Sampling collection**

This study was conducted from Jun 2015 to first week of September 2015. This period was rainy for first month but latter there was drought with more heat for august in this year. Agricultural activities were collapsed due to poor rain. Sampling was performed by using following two methods.

Methods used for ant sampling are hand collection (Romero and Jaffe, 1989; Samson *et al.*, 1997; Watanasit, 2003), honey baits (Yamane and Hashimoto, 1999).

**All- out search method**

The most commonly used method is all-out search method. The ants were just picked up using brushes or forceps. Care should be taken to collect all castes from a colony in the case of polymorphic species, because the phenomenon of polymorphism can lead to major confusions, during sorting and identification.

**Honey baits**

Honey baits were used to collect ants feeding on nectar. A piece of cotton dipped in honey was placed randomly. The cotton baits were left for 0.5 hrs before they were collected.

**C. Ant identification:**

Specimens were examined with magnus stereomicroscope. The collected ants were identified up to the genus level with the help key given by IISC, Bingham (1903), Bolton (1994), Tiwari (1999), and upto the species level byNicola J. R. Plowes and Richard Patrock (2000) and Jerry et al., (2002).

For digital images, 16x canon digital camera was usedand imageswere processed with Adobe Photoshop and pisaca program.

## II. RESULT AND DISCUSSION

This plain of River Purna is very rich in diversity of ants. Few *Solenopsis* worker were collected from cultivated land between village Tiwadi (Ajampur) and Pimpalgaon (Kale), location was healthy and completely undisturbed so suitable for ants richness. Workers were foraging on ground in flock around food bait and also in grasses. They might be attracted there due to lamp at night as specimens were collected early in morning. I could not find out its nest on any tree and other places surveyed around there. Workers were randomly collected and were selected for comparison with *Solenopsis geminata* that are commonly found and were collected early.

This species is yellowish red whereas all other fire ants are light to dark brown and have a well-developed petiolar process. Gaster light colored, yellow red.Workers lighter in color with a light colored gaster, often with brown patches. The eyes are small (about 50 ommatidia in the major, 20 in the minor), being separated from the insertion of the mandibles by about twice the maximum diameter of the eyes. The majors have lateral teeth on the clypeus. (Mackayand Mackay, 2002).

During the present investigation this species was observed in cultivated field near village Pimpalgaon (Kale).

*Solenopsis aurea* found differ from common known species *Solenopsis geminata* in following feature:

i) It having characteristic identifying feature i.e. presence of keel like tooth beneath the petiole which directing backward beneath first node. ii) having small worker size, iii) having thorax and pedicel sculptured iv) by coloration, and v) mandible with pubescence.

With above special differences *S. aurea* has following descriptive feature:

**Description:**

**Head:** Head longer than wide, smaller than *S. geminata*, antennal scrobe in full face view found very closed to clypeus, antennal scape longer over half-length to vertex, vertex of head indented, not with deep groove, mandible with distinct teeth, clypeal teeth distinct, vertex dull with numerous hairs, eye small near clypeus instead of being middle, antenna 10 segmented with 2 segmented club.

**Mesosoma:** Mesosomal outline in lateral view continuous, sculptured, propodeal dorsum forming obtuse angle with declivity, propodeal spiracle oval, tibia tubular with longitudinal row of spiny bristles near spur.

**Petiole:** Petiole and post-petiole equal and distantly arranged, petiole with keel like tooth or distinct and well developed petiolar process beneath the first node, petiole having hairs. Both nodes are equal in size.

**Gaster:** Gaster oval, longer than broad.

**Sculpture:** Mesosoma and pedicel are sculptured, mesosoma finely reticulated, gaster shiny.
**Vestiture:** Pilosity yellowish; head, mesosoma and all gaster segments with dense, erect short setea; antennae pubescent scape with antennal segements and club bear pilosity, petiole and post-petiole having long polosity.
**Color:** Body yellowish-red; head, antenna, legs and abdomen yellow; mesosoma reddish.

**III. Distribution:**

This species seem to be rare in Maharashtra and even in India, as its record not found in both list of Indian ants that are given by Indian Institute of Science, Bangalore and that given by Himendar Bharti.

## IV.Notes

*Solenopsis aurea* can be easily distinguished from *Solenopsis geminata*. Head of *Solenopsis aurea* is smooth, deep groove not present at posterior margin like *S. geminata*. Eyes well within cephalic margin while in *S. geminata* eyes are present mid-laterally. Additionally *S. aurea* is light colored while *S. geminata* is darker and reddish in comparison. Antennal scrobe present very near to posterior margin of clypeus. In *S. aurea*, mesosoma profile continuous, sculptured and finely reticulated while in *S. geminata* it is discontinuous and not reticulated.*S. aurea* have equal sized nodes, while *S. geminate* have unequal sized node. And most notable feature is, keel like tooth present beneath petiole directing backward while *S. geminata* has not this keel like tooth.

**Fig:1 *Solenopsis aurea* .**

**Fig:2 *Solenopsis geminata*.**

**Fig:1 *S. aurea* showing keel like tooth and abundant hair.**

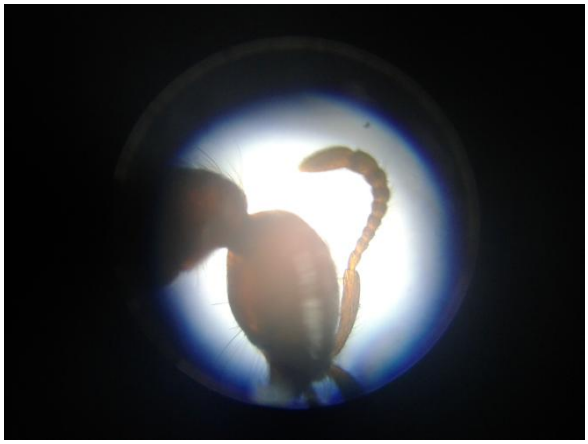

**Fig:1 *S. aurea* – head with 10 segmented antenna and longer scape.**

**Fig:1 *S. aurea* showing keel like tooth under petiole continuous thorax and tubular tibia.**

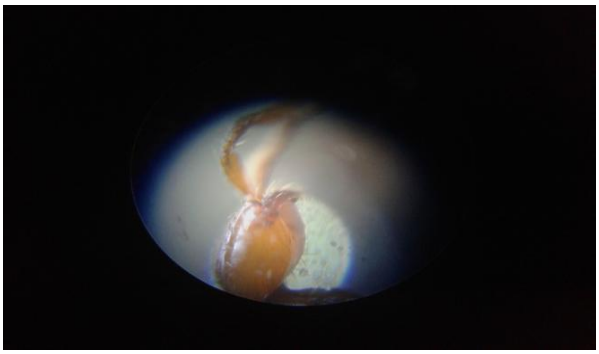

**Fig:1 antennal scrobe very closed to clypeus.**

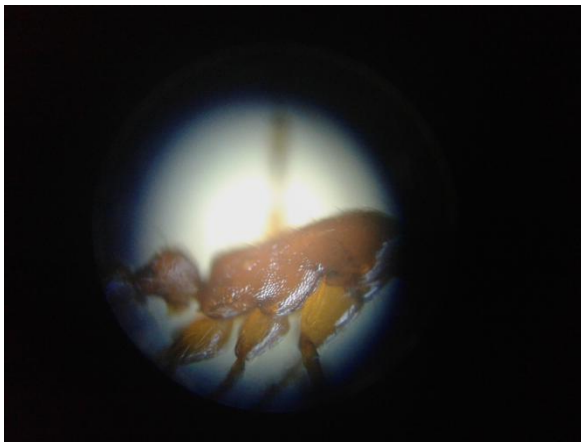

**Fig:1 mesosoma sculptured and finely reticulated with oval spiracle.**

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