

THE DISTRIBUTION OF THE MOUNTAIN ANT *Manica rubida* (LATREILLE, 1802) (HYMENOPTERA: FORMICIDAE) IN ROMANIA – INSIGHTS FROM CITIZEN SCIENCE

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KEYWORDS: mountain habitats, Citizen Science, distribution, ecology.

ABSTRACT

Manica rubida is an ant species associated with mountain habitats. Although the species is common, there are few published records of its presence in Romania's scientific literature. Therefore, Citizen Science offers the potential to significantly enhance our overall knowledge of the species' distribution through the use of specific databases such as iNaturalist. Thus,

the species appears to be restricted primarily to the Carpathian Mountains, with few records outside this typical range. Most observations are from altitudes exceeding 1000 m. Adopting the Citizen Science approach via targeted species projects can further improve the understanding of species distribution and contribute to a better grasp of their biology and ecology.

REZUMAT: Distribuția speciei de furnici montane, *Manica rubida* (Latreille, 1802) (Hymenoptera: Formicida) în România – Aspecte utilizând Știința Participativă

Manica rubida este o specie de furnică asociată cu habitatele montane. În ciuda faptului că specia este comună, există puține semnalări ale speciei cunoscute din literatura de specialitate din România. Prin urmare, Știința Participativă (Citizen Science) poate îmbunătăți cunoștințele generale despre distribuția speciei utilizând baze de date specifice precum iNaturalist și altele. Astfel, specia este distribuită cu

precădere în Carpați, cu puține semnalări în afara acestor zone tipice. Majoritatea semnalărilor provin de la altitudini de peste 1000 m. Utilizarea abordării prin Știința Participativă prin proiecte țintite pentru specii, poate îmbunătăți cunoștințele generale despre distribuția speciilor și poate contribui la o mai bună înțelegere a biologiei și ecologiei acestora.

ZUSSAMENFASSUNG: Die Verbreitung der Bergameise *Manica rubida* (Latreille, 1802) (Hymenoptera: Formicidae) in Rumänien – Erkenntnisse aus der Citizen Science

Die Gebirgsameise *Manica rubida* ist eng an Gebirgshabitate gebunden. Obwohl diese Art weit verbreitet ist, existieren in der rumänischen Fachliteratur nur wenige gesicherte Nachweise. Die Bürgerwissenschaft (Citizen Science) bietet daher eine hervorragende Möglichkeit, mithilfe spezialisierter Datenbanken wie iNaturalist und ähnlichen Plattformen, unser Wissen über die Verbreitung dieser Art deutlich zu erweitern. Den gesammelten Daten zufolge konzentriert sich die Art hauptsächlich auf die Karpaten, wobei Funde außerhalb dieser typischen Regionen selten sind. Die meisten Beobachtungen stammen aus Höhenlagen von über 1000

Metern. Durch den gezielten Einsatz von Citizen Science-Projekten können wir die Kenntnis über die tatsächliche Artenverteilung verbessern und somit zu einem tieferen Verständnis ihrer Biologie und Ökologie beitragen. Karpaten verbreitet, mit wenigen Nachweisen außerhalb dieser typischen Gebiete. Die meisten Nachweise stammen aus Höhenlagen von über 1000 m. Die Nutzung des Bürgerwissenschafts-Ansatzes durch gezielte Projekte für Arten kann die allgemeinen Kenntnisse über die Verbreitung von Arten verbessern und zu einem besseren Verständnis ihrer Biologie und Ökologie beitragen.

INTRODUCTION

Manica rubida (Latreille, 1802) is a large, reddish-brown ant belonging to the subfamily Myrmicinae. It is one of the largest ant species in Europe, with workers measuring 6-9 mm and queens 9.5-13 mm. It can be distinguished from its close relatives, such as *Myrmica rubra*, by its larger size, more slender build, and the absence of propodeal spines. The head and gaster are typically darker than the rest of the body. They possess a painful, venomous sting, which they use for defense and hunting (Seifert 2018).

Manica rubida is a montane species, found in sunny habitats with sparse, low vegetation, such as meadows and pastures, at elevations ranging from 400 to 2,200 meters above sea level. They also occur in montane forests and on river terraces. Their nests are typically located underground, often under large stones. While they are usually fully subterranean, some nests may have a wide, flat, crater-like mound of excavated soil around the entrance, particularly in sandy habitats. In some rare cases, they have been observed to build nests with above-ground mounds, possibly as an adaptation to unfavorable, shady conditions (Seifert 2018).

Colonies can be either monogynous (one queen) or polygynous (multiple queens) and can grow to several hundred to a few thousand workers. They are considered semi-claustral, meaning the founding queen needs to forage for food during the initial stages of colony establishment. Their diet is primarily protein-based, consisting of insects, which they actively hunt. They also consume sugars from sources like honeydew (Czekoswki et al., 2012; Seifert, 2018).

Swarming flights occur from late May to early September. Colonies undergo hibernation from October to March, ideally at temperatures between 5-15°C. This period of diapause is essential for the colony's health and stimulates brood production after winter (Seifert, 2018).

Manica rubida is known to be present in Romania, and its distribution is likely concentrated in the mountainous

regions of the country, particularly in the Carpathian Mountains (Markó et al., 2006).

According to a general catalogue of European ants, *Manica rubida* is found in the Palaerctic region in many countries such as Andorra, Armenia, Austria, Belgium, Bulgaria, Croatia, Czechia, France (type locality), Georgia, Germany, Greece, Hungary, Italy, Montenegro, North Macedonia, Poland, Romania, Slovakia, Slovenia, Switzerland and Türkiye (https://www.antwiki.org/wiki/Manica_rubida).

While a comprehensive, country-wide distribution map is not readily available in the scholarly literature, the species' known habitat preferences (high-altitude, sunny, and stony areas) suggest it is likely found in other parts of the Romanian Carpathians as well, such as the Southern Carpathians and the Apuseni Mountains (Borowiec 2014).

A study on the ant fauna of the Rodna Mountains National Park (part of the Eastern Carpathians) in northwestern Romania confirmed the presence of *Manica rubida*. The paper noted that the species is a "typical mountain species" found in sunlit stony areas with low xerophilous vegetation, which are common habitats in the Rodna Mountains (Tăușan 2009).

In a general perception, Citizen Science refers to the involvement of non-professional scientists (the public) in the scientific process, often in collaboration with professional researchers. Citizen Science projects leverage a large number of volunteers, allowing for data collection across a vast geographic area (like all of Romania) and over long time periods that traditional, field-intensive research alone cannot match (Pocock et al., 2014).

This is crucial for tracking species distributions. s highly effective for documenting **species** distribution (mapping where the species is found) and can even help in the early detection of range shifts due to factors like climate change or land-use change, which is a relevant topic for our target species, *Manica rubida* (Krapf, 2023).

Citizen science represent an invaluable approach for generating large-scale, fine-resolution data on species distribution, which is particularly useful for a species like *Manica rubida* where

MATERIALS AND METHODS

Data was retrieved from the available literature and from the Citizen Science data base such as iNaturalist, Gbif, and Facebook group “Insects of Romania and Europe”.

RESULTS AND DISCUSSIONS

Based on data, the Citizen Sciences sources show that almost all records are restricted to the Carpathians. *Manica rubida* was observed in Retezat, Piatra Craiului, Bucegi, Parâng, Făgăraș, Cozia, Apuseni and Rodna mountains. The species was previously known also from the Carpathian area, especially from the Meridionali Carpathians (Knechtel, 1956;

professional surveys are limited (Markó et al., 2006; Arcos, 2025).

Herein we give an updated distribution map of *Manica rubida* in Romania based on existing data from the literatura and using Citizen Science data.

The obtained data base was used for the distribution map using QGIS software..

Cîrdei and Bulimar, 1965; Fromunda *et al.*, 1967; Paraschivescu and Raicev-Arcașu 1967; Paraschivescu, 1972; Paraschivescu, 1975; Goagă and Paraschivescu, 1991; Markó and Csósz, 2002). Yet, the Citizen Science data, improved the overall knowlege of the species distribution which is confined within the Carpathian arch with few exceptions (Fig. 1).

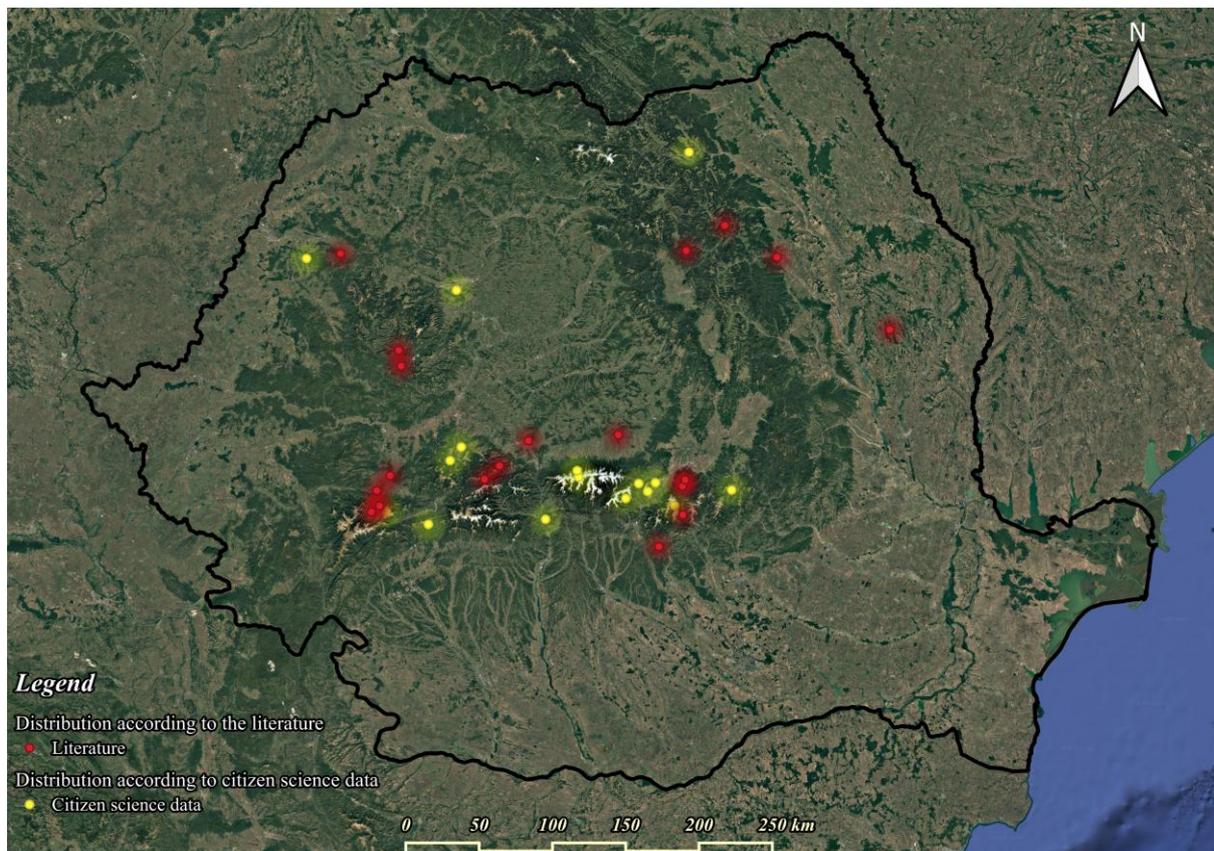


Figure 1: The known distribution of *Manica rubida* in Romania based on literature and Citizen Science data (red circles – data retrieved from the literature, yellow circles – data retrieved from the Citizen Science databases)

The limitation of Citizen Science consist of species complicated identification. In cryptic species, these data are debatable and are hardly valid. However, in other cases such as *Manica rubida* a quality photo of the species, at least in a lateral view is enough for accurate identification. There are low chances of misidentification of *Manica rubida* with different species belonging to *Myrmica* genus. The lack of spines on the propodeum, and the overall large individuals make the data easy for validation (Czechowski *et al.*, 2012; Seifert, 2018) (see in Fig. 2).

Despite that the species is known from many mountain areas, the data is rather

poor. Most likely, the species is overlooked. Yet, some records place the species in lower altitudes such as the surrounding of Cluj-Napoca or near Barcana village (Bacău County). Our data confirm the recent study of Krapf (2023) which places *Manica rubida* with an more abundant distribution in the Western part of Europe and less frequent in the Eastern Part.

Yet, there is a clear known difference of Citizen Science involvement between this areas regarding the interest towards nature. These aspects have several components and are in a strong correlation with social, economic and political structure (Hecker *et al.*, 2018).



Figure 2. Lateral view of *Manica rubida* (with the permission of © AntWeb.org, photo: April Nobile)

The case of *Manica rubida* is a stepping stone for further projects which aim to reveal more about species distribution, at least for species which are easy to identify

in the field and involve citizens in nature conservation. These data are easy to obtain and freely available.

ACKNOWLEDGEMENTS

The author thanks all volunteers that contributed on the Citizen Science data bases and thus contributed to a better understanding on the distribution of *Manica rubida* in Romania. Also, special thanks to MSc Iulia Șerban for the help in compiling the distribution map. Last and not least, my gratitude towards AntWeb and especially to April Nobile for the use of the picture of *Manica rubida*.

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