

INVASIVE ANT SPECIES (HYMENOPTERA: FORMICIDAE) IN ROMANIA

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Abstract

In the past decade scientific interest in invasive species, in particular ants, has intensified. Although extensive knowledge was gathered on invasive ant species in Europe, still very few data are available concerning Romania. Currently only two such species are known in the Romanian myrmecofauna: *Monomorium pharaonis* and *Lasius neglectus*. In this article the distribution of these two species is presented and their possible occurrence in other areas is discussed. The probability of the occurrence of additional exotic species such as *Tapinoma melanocephalum*, *Linepithema humile* and others is also largely treated.

Key words: invasive species, exotic species, ants, *Monomorium pharaonis*, *Lasius neglectus*, Romania

Introduction

Alien species spread through human assistance (mostly commerce and tourism) may become a major threat for indigenous fauna if they bear invasive characters. Such species can exhibit explosive population growth when invading, and may become dominant species of certain regions excluding other, native species (LOWE & al. 2000). Social insects, particularly ants, seem to be especially efficient invaders, documented also by the fact that five species on the list of '100 of the world's worst invasive alien species' are ants (LOWE & al. 2000): *Anoplolepis gracilipes* (SMITH, 1857), *Linepithema humile* (MAYR, 1868), *Pheidole megacephala* (FABRICIUS, 1793), *Solenopsis invicta* BUREN, 1972 and *Wasmannia auropunctata* (ROGER, 1863). Also several other ants species could be added to this top list based on their recently updated world-wide distribution and their ecological and economical impact, e.g. *Paratrechina longicornis* (LATREILLE, 1802) (WETTERER 2008), *Tapinoma melanocephalum* (FABRICIUS, 1793) (WETTERER 2009a) and *Monomorium destructor* (JERDON, 1851) (WETTERER, 2009b). Currently ant species from more than ten genera belonging to three subfamilies are regarded as invasive species (also known as tramp species) posing considerable threat to indigenous fauna (HÖLLDOBLER and WILSON 1990) mostly on tropical and sub-tropical islands (WETTERER et al. 2006, WETTERER 2007, 2008, 2009a,b). While even native ants can cause serious damages to plantations, and various crops (e.g. VÖRÖS and GALLÉ 2002, ESPADALER & al. 2006), it is not surprising that besides constituting nature conservation threats invasive ants can also cause severe economical losses (LOWE & al. 2000, ESPADALER and BERNAL 2003, WETTERER & al. 2006, WETTERER 2007, 2009b).

There are some general characteristics of invasive ant species: colonies are polygynous, usually unicolonial, mating is intranidal, colonies are mostly founded by budding, and swarming is generally lacking (PASSERA 1994, DEKONINCK & al. 2006, ESPADALER & al. 2007, CREMER & al. 2008). In Europe the largest supercolony to date is known in the invasive Argentine ant *L. humile* and it stretches as far apart as 6000 km along the SW coast of the Mediterranean from Portugal to Italy (GIRAUD & al. 2002). Long-distance dispersal among locations is mostly done by commercial transport. In most cases either isolated queens or small parts of a polygynous colony are transported. Invasive ants are also usually highly aggressive and superior as competitive ability to other similar native species (TARTALLY 2000, CREMER & al. 2006). However, the exact causes that lead to the evolution of invasiveness are usually not known, with very few exceptions (CREMER & al. 2008).

As global climate change has serious impact on the distribution of invasive ant species as well (ROURA-PASCUAL and SUAREZ 2008) the interest in their distribution greatly increased in the past few years concerning both their world-wide presence (see the comprehensive papers of WETTERER & al. 2006, WETTERER 2008, 2009a,b) but particularly their presence in Europe and their impact on the European fauna (e.g. TARTALLY 2000, ESPADALER and BERNAL 2003, TARTALLY 2006, DEKONINCK & al. 2006, ESPADALER & al. 2007, CREMER & al. 2008, UGELVIG & al. 2008, NAGY & al. 2009). Altogether 32 exotic ant species are known in Europe (SCHLICK-STEINER & al. 2008), and seemingly invasive ant species have so far remained restricted to climates with warm winters and have not been able to penetrate any cold-temperate regions, with the exception of a few species like *M. pharaonis* (CZECHOWSKI & al. 2002) and *T. melanocephalum* (WETTERER 2009a), which inhabit heated premises in temperate Europe.

Although the amount of available information on invasive ant species in Europe considerably increased recently, this is not valid for Romania. The Romanian myrmecofauna currently contains 105 species (MARKÓ & al. 2006, MARKÓ 2008a,b), which is, however, considerably less than the known fauna of other surrounding countries (see MARKÓ & al. 2006 for an exhaustive comparison). Mostly cryptic, sub-Mediterranean and parasitic species are lacking from this list, but there are also other quite common ant species which were not yet reported from Romania, such as common tramp species, and other exotic, but not invasive species. Further on the available data on Romanian introduced and invasive species are presented and discussed.

Notes on the known Romanian species

Currently only two introduced and also invasive ant species are known from Romania: *Monomorium pharaonis* (LINNAEUS, 1758) and *Lasius neglectus* VAN LOON, BOOMSMA & ANDRÁSFALVY, 1990.

(1) *Monomorium pharaonis*, the pharaoh ant, belongs to the subfamily Myrmicinae and it is one of the most wide-spread tramp ant species of the world. It is probably original from South Asia, thus, like so many tropical and sub-tropical species, it is only present in heated buildings in temperate or cold-temperate regions of Europe (CZECHOWSKI & al. 2002). It is also one of the oldest tramp ant species of temperate Europe; it was already recorded more than 100 years ago in Belgium

(BONDROIT 1911 in DEKONINCK & al. 2006). It is present on all continents of the world (except Antarctica), and it is known from almost every European country (RADCHENKO 2007). It forms huge unicolonial, polygynous nests in the walls of flats, causing damages in the structure of the buildings, but even more it constitutes a permanent hygienic threat. The tiny, yellow ants are easy to recognize even for amateurs.

In Romania it is currently known only from Bucharest, where it was collected in flats (PARASCHIVESCU 1978) (Fig. 1.), but there are anecdotal reports from the city of Cluj-Napoca as well (A. RUCĂNESCU pers. comm.). Strangely enough there are no other records regarding the occurrence of this common European indoor species in Romania, but that does not mean that it is absent from other inhabited areas of the country. In fact the lack of data might just suggest that Romanian pest control agencies are not concerned with the specificity of indoor pest ant species. It is expected to be as widely spread in Romania as in other European countries generally.

(2) *Lasius neglectus*, the invasive garden ant, belongs to the subfamily Formicinae, and it is one of the most recent invasive species of Europe as it was described as separate species only in 1990, although its first record in Europe (Budapest) dates back to 1973 (VAN LOON & al. 1990). Its native range is probably Asia Minor, where native populations are still known, but such populations could also occur in the Black Sea region (CREMER & al. 2008). In Turkey it co-occurs with its sister species, *L. turcicus* SANTSCHI, 1921 (CREMER & al. 2008). Unlike the pharaoh ant the invasive garden ant, as it is also suggested by its name, can occur both indoor and outdoor. Usually it forms large networks of interconnected and mutually tolerant nests, each of which contain multiple queens. These supercolonies can cover several tens of hectares; the biggest known supercolony in Europe is in Budapest and it spreads over more than 3600 ha (ESPADALER & al. 2007; see Appendix 1 in NAGY & al. 2009). However the average size of a supercolony usually varies around several ha (ESPADALER & al. 2007). It heavily depends on aphids, thus it prefers areas sparsely overgrown by trees (ESPADALER and BERNAL 2003, ESPADALER & al. 2007), but it avoids shady, cool, densely overgrown areas (TARTALLY 2006). It is the only known outdoor invasive ant species, which shows cold-hardiness, and hibernates, thus it has the potential of expanding farther north (ESPADALER & al. 2007). Currently its northernmost known location is Rostock, Germany (SCHULTZ and BUSCH 2009). Its pest status is documented besides the 'usual' damages in buildings, vegetation and hygienic threats, by its considerable impact on the arthropod fauna (NAGY & al. 2009), and by excluding other, native ant species, mostly those occupying similar niches (TARTALLY 2000, CREMER & al. 2006, TARTALLY 2006). The exclusion of rival ant species occurs not just indirectly due to the expansion of its supercolonies, but also directly due to its aggressive behaviour towards rivals (CREMER & al. 2006). As its expansion rate is quite high it poses real threat to native ant communities where it is established (TARTALLY 2006, ESPADALER & al. 2007).

In 1998, when the Romanian data was published (MARKÓ 1998), it was known only from 28 localities in 12 countries, whereas almost ten years later in 2007 it was already recorded from 77 localities in 14 different countries outside of Turkey (see ESPADALER & al. 2007 for detailed data and references): Spain (even the Canary Islands), Italy, France, Belgium, Germany, Poland, Hungary, Bulgaria, Greece, Kyrgyzstan, Georgia, Uzbekistan, Iran. Due to the increasing interest of myrmecologists in this species, but also to its rapid expansion it was already reported

from more than 100 sites of Europe in 2009, mostly from urban parks and gardens (ESPADALER and BERNAL 2003). Accordingly the main introduction sites of the invasive garden ant are probably botanical gardens, city parks, and, paradoxically, institutes of plant protection research (ESPADALER & al. 2007), while up to now it has not been found in natural habitats in Europe (UGELVIG & al. 2008).

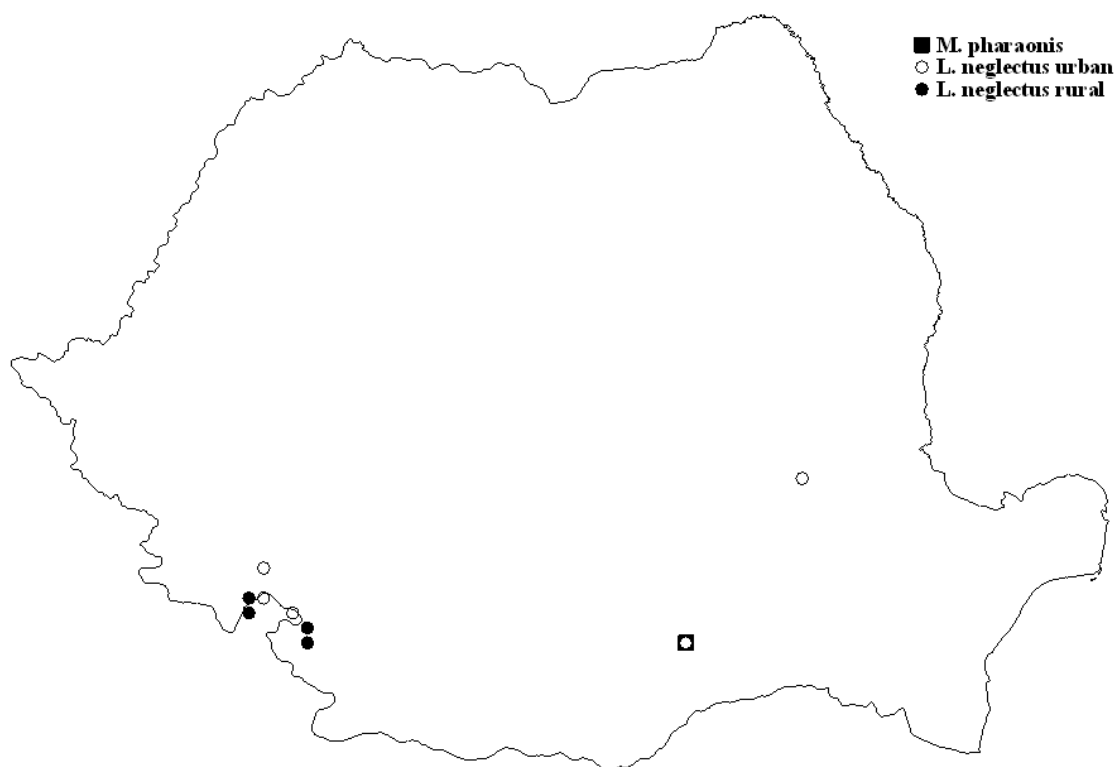


Fig. 1. Distribution of *Monomorium pharaonis* (filled square) and *Lasius neglectus* (filled and empty dots) in Romania based on published data.

Most of the European populations have fairly similar origin and rather recent introduction date, as the level of aggression among different European populations is low (UGELVIG & al. 2008). On the basis of genetic, geographic, cuticular hydrocarbon and behavioural correlates jump dispersal of this species is most likely in Europe (UGELVIG & al. 2008). An up-to-date situation on its world-wide distribution as well as useful information on its biology, and pest control can be found on <http://www.creaf.uab.es/xeg/Lasius> webpage due to dr. Xavier ESPADALER's courtesy.

In Romania it was first collected in the central park of the small southern spa town of Băile Herculane (Caraș Severin County, SW Romania) in 1996 (MARKÓ 1998). Later on it was also found outside the town at roadsides (MARKÓ unpublished). Since then it was reported from Bucharest (S Romania), Drobeta Turnu Severin, Dubova, Ieșelnița, Orșova, Rogova, Vânju Mare (Mehedinți County, SW Romania), and Rîmnicu Sărat (Buzău County, SE Romania) (ESPADALER and BERNAL 2003, ESPADALER & al. 2007) (Fig. 1). Intriguingly several localities, where this species is

known from, are villages (Dubova, Ieşelnița, Rogova) or mostly rural areas (the small town of Vânju Mare) lacking almost entirely any sign of classical urbanism (e.g. large parks with introduced plants, vast paved areas, compact built-in neighbourhoods etc.). As a comparison, the European known populations are found mostly in urban habitats. Its concentrated occurrence in SW Romania along with its rural presence emphasizes the possibility of its step-by-step natural dispersal in Romania. However, based on its introduction background in Europe, its jump dispersal is also expected in Romania.

Discussions

The scarcity of data would suggest the lucky, invasive species-free status of Romania at first glance, but I feel that it would be a severe mistake to state that. It is anecdotic, yet entirely true that the distribution map of most insect species does not illustrate their real distribution but merely the distribution of collectors (PAPP 1993). According to the comprehensive study of SCHLICK-STEINER & al. (2008) there is a positive correlation between the number of native and exotic ant species. Thus one could expect a higher number of exotic species in Romania. The severe lack of information on Romanian invasive ant species is also emphasized by the ‘unnatural’ single occurrence of *M. pharaonis*.

One additional species is mentioned to occur in Romania, the ghost ant *Tapinoma melanocephalum* (RADCHENKO 2007, WETTERER 2009a). The ghost ant is a widely spread tropical-subtropical species, originating from sub-tropical South America, and it is probably currently extending its range in Europe (DEKONINCK & al. 2006, WETTERER 2009a). In temperate Europe it inhabits heated buildings and greenhouses (DEKONINCK & al. 2006). It is known from many European countries including even Sweden, Finland, Germany, European Russia, Switzerland and Austria (DEKONINCK & al. 2006, WETTERER 2009a). According to RADCHENKO (2007) (see also in WETTERER 2009a) it is also known from Romania but up to now there was not found any published evidence for its presence despite the exhaustive analysis of every published data on Romanian fauna (see MARKÓ & al. 2006). It is most likely that the data in Fauna Europea database (RADCHENKO 2007) is a simple mistake. On the other hand, based on the species currently known distribution in Europe, its occurrence in Romania is expected.

The longhorn crazy ant *Paratrechina longicornis* could also occur in Romania, as it currently known from the Czech Republic, Germany, France or even from Estonia (WETTERER 2008). The presence of the Argentine ant *Linepithema humile* is also plausible in the Southern part of Romania, e.g. at the Black Sea shore in the vicinity of commercial harbours. In such places a number of Dacetini species and exotic members of the subfamily Ponerinae could also occur (see Markó 2008b for a complete list of such species). In addition to these species quite a high number of other exotic ants could be already established in Romania based on their European presence (see the complete list in SCHLICK-STEINER & al. 2008).

As a conclusion a thorough investigation of possible introduction sites is needed in Romania: shipping sites, plantations, parks, green houses should be notoriously searched for potential introduced ant species.

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Specii de furnici invazive (Hymenoptera: Formicidae) în România

rezumat

În ultimele decenii interesul științific în biologia speciilor invazive, în special în ceea ce privește speciile de furnici, s-a intensificat simțitor. Deși foarte multe date și cunoștințe au fost colectate respectiv acumulate referitor la speciile de furnici invazive în Europa, totuși foarte puține cunoștințe avem în ceea ce privește prezența lor în România. În acest moment doar două specii de furnici invazive sunt cunoscute în mirmecofauna țării: *Monomorium pharaonis* și *Lasius neglectus*. În cadrul acestui articol distribuția acestor specii este prezentată dar sunt tratate și posibilitățile apariției lor și în alte zone ale țării. Deasemenea este discutat și eventuala apariție ale altor specii exotice ca *Tapinoma melanocephalum*, *Linepithema humile* și altele.

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