

# European Fire Ant, Red Ant (suggested common names), *Myrmica rubra* Linnaeus (Insecta: Hymenoptera: Formicidae: Myrmicinae)<sup>1</sup>

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## Introduction

*Myrmica rubra* Linnaeus, often called the European fire or red ant, is an adventive species found mainly in the northeastern United States. It was first discovered in Massachusetts in 1908 by Wheeler [1908]. This stinging ant species is considered to be a potential health and ecological risk to the U.S.

The first reports of red ants stinging people in Maine occurred from the late 1960s to the mid 1970s, but it was not until 1986 that the species was confirmed as *M. rubra*. Complaints received by the University of Maine Cooperative Extension office have increased sharply since 1998 [Groden et al. 2005]. Today *M. rubra* is considered a nuisance pest in most places where it is established in North America.

However, in Europe and northern Asia, where these ants are native, ants in the genus *Myrmica* are considered important for the conservation of rare *Maculinea* butterflies which live in association with the ants. *Myrmica rubra* in particular is considered to be a host for *Maculinea teleius*, *M. nausithous*, and two cryptic species of *M. alcon* [Elmes et al. 1998]. These butterflies are an important research topic due to their social-parasitic relationship with *Myrmica* ants and their importance as bioindicators of the health

of Palearctic, and moist-grassland ecosystems in Europe [Mouquet et al. 2005].

## Synonymy

*Mymica longiscapus* Curtis, 1954

*M. bruesi* Weber, 1947

*M. europaea* Finzi, 1926

*M. champlaini* Forel, 1901

*M. laevinodis* Nylander, 1846

[from Bolton et al. 2006]

## Distribution

*Myrmica rubra* is native to the Palearctic regions of Europe and Asia from Ireland to western Siberia [Czechowski et al. 2000]. In the Old World, *M. rubra* is found from 25° latitude north to the Arctic Circle (66°N) [Elmes et al. 1999]. Based on its native distribution, the potential invasive range of *M. rubra* in North America would span the southern-most inland part of Florida to the north of Hudson Bay in Canada.

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In North America, *M. rubra* has been reported in Maine, Massachusetts, New York, Pennsylvania, New Jersey, Washington D. C., Rhode Island, New Hampshire in the US, and in Ontario, Québec, New Brunswick, and Nova Scotia in Canada [Grodén et al. 2005].

Since 2001, entomologists at the University of Maine have conducted periodic surveys to determine the movement and the area colonized by the ant. In Maine, the ant is restricted to humid places along the coast. However, colonies have been reported at inland locations and there is a concern that the ant is capable of establishing in these new areas.



Figure 1. Distribution of the European fire ant, *Myrmica rubra* Linnaeus, in the United States and Canada. This information is based on the published literature and surveys conducted between 2002 and 2004.

Credits: H. Alejandro Arevalo, University of Maine

## Description

*Myrmica rubra* is a Myrmicine ant, one of 116 species recorded in this genus. There are several species of *Myrmica* in North America. Among the most commonly reported are *M. detritinodis*, *M. incompleta*, *M. emeryana*, *M. brevinodis*, *M. americana*, *M. fracticornis*, and *M. evaneda*, which makes the morphological identification of *M. rubra* complicated. Some of these species are not very common in the northeastern United States and most are rarely found in disturbed areas, which help us to recognize *M. rubra* in the field.

Workers of *M. rubra* are of a reddish-brown color, but the coloration greatly varies between individuals and colonies. Workers are small (4 to 5 mm), their “waist” has two segments, the head and the mesosoma are heavily sculpted, but the abdomen is shiny. The worker’s body is covered with fine hairs. The antennae are 12-segmented with a four-segmented club and a bent scape. The propodeum (the first abdominal segment fused anteriorly to the thorax) has two spines pointing backwards, which is one of the main differences with other native ants (not of the genus *Myrmica*) in the northeastern U.S. There are a few morphological differences that help to differentiate *M. rubra* from the other ants within the same genus. When viewed dorsally, the frontal lobes of *M. rubra* look thin and lamellar, laterally developed and do not cover the antennal base, and the propodeal lobes form a 90° angle apically (Francoeur, unpublished data).



Figure 2. Adult worker of the European fire ant, *Myrmica rubra* Linnaeus. Notice the sting, the two-segmented “waist” and the two spines on the propodeum.

Credits: E. Groden, University of Maine

In North America, *M. rubra* nests are cryptic and difficult to spot at first glance, as they do not construct obvious mounds from soil. Nests are usually in places that maintain high humidity for the colony including in the soil along roots of trees or shrubs, under rocks, logs or other human or natural debris, and in decaying logs. Their nest densities are extremely high in infested areas in the U.S., averaging

between 0.5 and 1.5 nests per square meter, compared with 0.02 to 0.3 nests per square meter in its native habitat in England (Grodén et al. 2005).



Figure 3. Detail of the head of an adult worker of the European fire ant, *Myrmica rubra* Linnaeus. Notice the bent scape, the frontal lobes with respect to the base of the antenna, and the sculptured head. Credits: E. Grodén, University of Maine

## Life Cycle

The life cycle in the United States is still being studied. *M. rubra* is polygynous (many queens per colony) and polydomous (many nests per individual colony). This situation allows *M. rubra* to maintain very high densities of individuals and nests in some areas. *M. rubra* colonies are also extremely mobile and some colonies move their nests regularly throughout the summer.

In Europe, nuptial flights occur during mid-August to mid-September depending on the latitude. Queens overwinter before laying eggs for the first time. Some queens overwinter alone, others as groups of newly mated queens, and some join an existing colony. In the following spring, queens search for food to begin reproduction. Queens that are part of a group have an advantage in foraging for food, and these queens will usually experience higher survival than solitary queens.

From egg hatch to egg production, queens take at least two years to start a colony. In Europe, *M. rubra* produces two types of brood characterized by the time necessary to mature. Rapid brood develops in the year that it is laid, but a slower brood will overwinter as third instar larvae and mature to adulthood the following year [Elmes et al. 1998, Elmes et al. 1999].



Figure 4. Workers of the European fire ant, *Myrmica rubra* Linnaeus, gathering and protecting various larval instars after the nest was disturbed.

Credits: H.A. Arevalo, University of Maine

In the United States, the situation is different. No nuptial flights have been reported, and new infestations appear to be caused by human-aided dispersal, particularly with the movement of infested soil, mulch, and potted plants. Colonies that are already established spread to adjacent areas via budding. This occurs when one or more queens and a group of workers, frequently with brood, move from an existing colony to a new nest site to form a satellite colony. Maine populations overwinter with slow brood (third instars), but it is not certain whether colonies produce rapid as well as slow brood.

## Economic Importance

*Myrmica rubra* has become a significant pest in areas in the northeastern U.S. primarily because these aggressive, stinging ants interfere with people's use and enjoyment of their properties, gardens and parks. With *M. rubra*'s extremely high densities foraging both on and above ground on herbaceous plants, shrubs and trees, in combination with the cryptic nature of their nests, the probability of people and their pets inadvertently disrupting the ant's activities is very high. When disrupted, the ants will deliver a painful sting which has in a few cases produced severe allergic reactions to the venom including anaphylactic shock.



Figure 5. Symptoms of an individual sting by the European fire ant, *Myrmica rubra* Linnaeus.

Credits: E. Groden, University of Maine

*Myrmica rubra* infestations are particularly severe in many areas along the sea coast, lakes and streams. These are areas with high value for tourism. Home and business owners are concerned about the impact of these ants on their activities, income, and value of their property

In addition to its nuisance impact, *M. rubra* is also having significant effects on our natural ecosystems. *M. rubra* appears to be responsible for the reduction of the ant diversity, richness, and abundance in infested areas, and has also exacerbated populations of plant feeding hemipteran pests such as aphids and scales.



Figure 6. Worker ants of the European fire ant, *Myrmica rubra* Linnaeus, attending aphids and other homopterans in Maine.

Credits: F. Drummond, University of Maine

## Management

**Mechanical control.** One of the best means to reduce the impact of *M. rubra* is to prevent its further spread. The public should be aware of the risk involved in transporting

materials from infested areas. Potted plants, soil, mulches, and similar materials should be inspected on site and again before transplanting or use. Ant activity can be hard to detect if the colony is small and underground, so careful observation is necessary. If ants are found, it is necessary to avoid using the materials until they can be identified by a reliable source (entomologist, local Cooperative Extension Service office, or a university entomology identification program) and/or destroyed.

**Cultural control.** Another tactic is to make the environment less hospitable for this ant. These ants prefer high humidity, moist soil, reduced exposure to the sun (lightly shaded habitats). Reducing irrigation, mowing tall grasses and increasing sun exposure to the ground will decrease favorable nesting and foraging conditions for the ants. These ants build their nests under debris placed on the lawn, including rocks, boards, logs, and anything that maintains a moist environment underneath. Reducing nesting sites will reduce the populations and force the ants to nest elsewhere. This method will not eliminate *M. rubra*, but may help to keep population densities low.

**Chemical control.** If chemical control is necessary, the label of an insecticide labeled for ants should be followed precisely. Currently, the most effective materials to use are the food bait-based insecticides. Unfortunately, none of the insecticides screened by the Entomology program at the University of Maine have successfully eliminated these ant populations. Low concentrations (less than 1%) of boric acid mixed with a sugar attractant have been successful in the laboratory; however, results in the field have been inconsistent. Other control tactics are currently under evaluation.

For more information about the management of European fire ants, or any other pestiferous ants in gardens, yards, landscapes, or parks; please contact the local Cooperative Extension Service Office.

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