

Invasive Ant Threat



INFORMATION SHEET Number 27 • *Solenopsis richteri*

Risk: High

Solenopsis richteri Forel

Taxonomic Category

Family:	Formicidae
Subfamily:	Myrmicinae
Tribe:	Solenopsidini
Genus:	<i>Solenopsis</i>
Species:	<i>richteri</i>

Common name(s): black imported fire ant

Original name: *Solenopsis pylades* var. *richteri* Forel

Synonyms or changes in combination or taxonomy: *Solenopsis saevissima* var. *oblongiceps* Santschi, *Solenopsis pylades* var. *tricuspis* Forel, *Solenopsis saevissima* st. *richteri* Forel, *Solenopsis saevissima* var. *tricuspis* Forel

General Description

“Fire ant” is the name usually used to refer to members of the *S. geminata* species group. This group includes; *S. geminata* (sheet #24), *S. invicta*, *S. richteri*, *S. saevissima* (sheet # 28) and *S. xyloni* (sheet # 29). The group get their name from their ability to inflict especially painful bites and stings.

Solenopsis generic diagnosis: Small to medium-sized ants, total length of workers around 1–9 mm. Worker caste monomorphic or polymorphic. Antennae 10-segmented, including a 2-segmented club. Eyes small to medium in size. Mandibles with 4 or 5 teeth. Clypeus with a pair of longitudinal carinae that diverge anteriorly and run to margin where they often project as a pair of teeth or denticles. Anterior clypeal border with one median seta present, clearly differentiated and conspicuous. Rear face of propodeum more or less rounded, never with teeth, spines or thin flanges. Two nodes (petiole and postpetiole) present. Stinger extruded in most alcohol-collected specimens. Most species pale yellow to reddish brown (a few species dark brown to black) and predominantly smooth and shining usually with sparse, long hairs.

Distinction from other genera: Workers of *Solenopsis* are most often confused with workers of *Oligomyrmex*. They can be separated by the single central hair on the front margin of the clypeus (paired hairs are present in *Oligomyrmex*) and the rounded rear face of the propodeum (spines, teeth or flanges are present in *Oligomyrmex*). *Solenopsis* may also be confused with smaller species of *Monomorium*. In this case, the distinctly 2-segmented club will allow the identification of *Solenopsis*.

Species-level identification: Identification of fire ants to species is difficult and usually involves evaluating the morphology of a series of workers rather than just one specimen. This task is further complicated by the fact that interbreeding between several species has been recorded.

Identification of Solenopsis richteri worker

Size: polymorphic (major and minor castes). Total length 3–6 mm.

Colour: predominantly black, with mandibles, lateral lobes of clypeus, part of antennae, thoracic sutures, tarsi and spot on tergite 1 of gaster yellowish to dark brown. Dark median streak on face inconspicuous.

Surface sculpture: head and dorsal alitrunk (except propodeum) smooth, except for inconspicuous setae-bearing punctures; some of lateral alitrunk sculptured; sloping face of propodeum transversely striate; base of nodes often sculptured, rest of nodes smooth except for small setae-bearing punctures; gaster smooth.

General Description

Major workers: head elliptical to weakly cordate in largest workers, with sides convex and with a deep concave median groove down the middle of the vertex. Median clypeal tooth present, though may be short and blunt. Mandibles convex; eye ovate, often outer ring of facets appearing darker than interior facets; antennal scapes reaching almost to vertex. Metanotal impression conspicuous. Subpetiolar process reduced or absent. Erect hairs on head and anterior alitrunk abundant, less so on gaster.

Minor workers: head ovate, longer than broad in full-face view; antennal scapes reaching posterior margin of head.

Sources: Bolton 1987; www1; www3; www4

Formal description: Trager 1991.

The taxonomy of the *S. geminata* species complex is difficult and has been revised only recently making it difficult to be certain what literature relates specifically to this species. Trager (1991) provides a key to major workers of the *geminata* group.

Similarity to Solenopsis invicta

Solenopsis richteri and *S. invicta* are very similar morphologically and biologically. They have similar colony populations, foraging behaviours, diets, and feeding behaviours (Taber 2000). The two forms cross and produce viable hybrids (Briano et al. 1995a) and these hybrids occupy about 130,000 km² in North America, a larger area than remains of *S. richteri* (~30,000 km²; Shoemaker et al. 1994). The two are still considered separate species based on genetic (Ross & Trager 1990) and morphological characterization (Trager 1991).

Behavioural and Biological Characteristics

Feeding and foraging

Solenopsis richteri is omnivorous and opportunistic (Lofgren et al. 1975). The primary diet of *S. richteri* and *S. invicta* is small invertebrates and liquids (Hayes 1958 cited in Taber 2000; Vogt et al. 2002) and in some locations a high proportion of the diet can include seeds (Vogt et al. 2002). Occasionally foragers eat germ plasma of newly germinated seeds or girdle the stems of small seedlings (Lofgren et al. 1975). The venom of the fire ant is used to immobilise or kill prey, which is sometimes left for other nest mates to collect (Combs 1982 cited in Taber 2000). They may also build shelters over immobilised prey and these are tended and “milked” for their excretions (Taber 2000). Workers forage at random until food is located, and then recruit in large numbers to exploit the food (Folgarait et al. 2004). They feed predominantly at ground level, but may occasionally forage into trees as does *S. invicta* (Wilson & Oliver 1970 cited in Wojcik 1983). They also use subterranean foraging trails and cover food, which may be a response to reduce the hazard of attacks by phorid flies (Folgarait & Gilbert 1999). In the monogyne form of *Solenopsis*, colonies will defend foraging territories and nests will be relatively uniformly spaced (Vinson & Greenberg 1986). Workers from polygyne colonies may show little aggression to non-nestmate workers and not defend territories as occurs in polygyne *S. invicta* (Tschinkel 1998). They forage pre-

dominantly when the soil temperature at 5 cm depth is between 15°C and 37°C.

Colony characteristics

Nests are inconspicuous in soil when small (Lofgren et al. 1975). The queen raises the first brood in a sealed chamber 2–3 cm below the soil surface.

When the first workers emerge the nest is further excavated and a mound begins to appear. By 2½ to 3 years the mound has a typical dome-like shape (around 20cm tall) composed of excavated soil and surface plant material (Vogt et al. 2004). Vertical tunnels may extend into the ground a metre or more to the water table (Lofgren et al. 1975). The size of the mound above ground varies greatly with the vegetation and soil type, from flat and broad in sandy soil to 1 m high and wide in clay and also varies seasonally (Vogt et al. 2004). The brood's position in the mound is adjusted to regulate temperature. In hot weather it is deep underground and in cooler conditions is kept on the warm sunny side of the mound near the surface (Lofgren et al. 1975). The sting of workers is effective in preventing large animals from disturbing the mounds (Lofgren et al. 1975). Ants will swarm out of the nest and attack and workers will attach to the skin with their mandibles and sting repeatedly.

Both monogyny and polygyne forms of *S. richteri* occur. Specific amino acid substitutions in a gene are associated with the expression of monogyny or polygyny (Ross et al. 2003). Only monogyne colonies are reported in the US (Vogt et al. 2004).

In ideal conditions *S. richteri* may achieve high densities. In open pasture habitat sites in Argentina, densities ranged from 22 to 600 mounds per ha (Briano et al. 1995d; Calcaterra et al. 1999). In Mississippi, USA monogyne colonies averaged about 80 per ha (Vogt et al. 2004). Densities can vary seasonally, with Patterson (1994) finding a 25% reduction in the number of active colonies from spring to early autumn. Colonies are mobile with 75% of colonies moving (< 13m) during a 6 month study (Patterson 1994). Rain is at least one stimulus for emigration (Briano et al. 1995c).

Dispersal

Monogyne colonies: Dispersal is primarily via nuptial flights when climatic conditions are suitable (high soil temperatures and within 1–2 days of rain). Flights may occur all year in subtropical areas but primarily in late summer in North America. Queens mate only once (Ross et al. 1988, cited in Tschinkel 1998). Most queens (99%) fly less than 1.5 km from their origin but in extreme cases fly or be carried by the wind 10–15 miles (Markin et al. 1971 – refers to *S. richteri* or *S. invicta* but probably applicable to both species).

Polygyne colonies: Dependant colony founding through budding is the primary dispersal mechanism, as in polygyne *S. invicta* (Porter et al. 1988; Vargo & Porter 1989). This is likely to occur when colonies are actively growing in late spring and summer. Some independent colony founding may also occur, if some heavy queens with large fat reserves are produced as is the case in *S. invicta* (DeHeer et al. 1999). The timing of independent colony founding would be similar to monogyne colonies. Like monogyne queens these heavy queens are attracted to open, disturbed habitat patches in great numbers following mating flights (DeHeer et al. 1999).

Colonies are mobile and often nest in locations subject to flooding (Folgarait et al. 2004). Both monogyne and polygyne colonies could be dispersed by floating on water as in *S. invicta* and *S. geminata* (Jaffe 1993; Wojcik 1983).

Habitats occupied

In Argentina, *S. richteri* is found in pastures of varying water content including seasonally waterlogged grassland up to elevations of 12000 feet (Taber 2000). It is also readily collected along roadsides (Briano & Williams 1997 cited in Taber 2000). In the United States it prefers open areas of pastures, cultivated fields, and lawns (Taber 2000).

Queens of *S. invicta* preferentially select sites to nest on recently cultivated land or dirt roads over heavily vegetated areas

(Markin et al. 1971). Although *S. invicta* does not nest in heavily shaded areas workers forage, both on the ground and up trees, up to 60 m into dense forest in southern Alabama (Wojcik 1983).

Global Distribution (See map)

Native to

South America, from south-eastern Brazil (Rio Negro, Parana) west into Misiones Province. The southern part of the range is delimited by the Atlantic Ocean on the east and extends west to Medoza Province and as far south as Montevideo, Uruguay (Lofgren et al. 1975), and Buenos Aires Province in Argentina (Briano & Williams 2002).

Introduced to

Southern United States. Also reported erroneously from Saudi Arabia (Khan et al. 1999).

History of spread

Solenopsis richteri was first detected at the port of Mobile, Alabama, around 1918 (Hung & Vinson 1978) and once occupied much of Alabama and Mississippi (Trager 1991). It has since been out competed by *S. invicta*, which established about 25 years later (Hung & Vinson 1978). The current distribution of *S. richteri* in North America is restricted to about 30 000 km² of north-western Alabama and north-eastern Mississippi. This region is too cold for *S. invicta* (Korzukhin et al. 2001). Between *S. richteri* and *S. invicta* is a band of territory occupied by a hybrid between the two species (Trager 1991), although they are thought not to commonly hybridise in South America despite some overlap in distribution (Ross & Trager 1990).

Solenopsis richteri may still be spreading in the US, with relatively new records reported from Memphis, Tennessee where eradication attempts are underway (Jones et al. 1997 cited in Taber 2000).

Interception history at NZ border

No confirmed interceptions.

Justification for Inclusion as a Threat

Possess a painful sting chemically very similar to *S. invicta*, and capable of causing pustules, and in some cases anaphylaxis and death (Lofgren et al. 1975).

Potentially has a similar ecological impact in the United States to monogyn colonies of *S. invicta*, although no research on ecological impacts specific to *S. richteri* was found. This ant has the potential to impact severely on native vertebrates due to its aggressive colony defence. It is established outside its native range and in the absence of *S. invicta* would likely occur across a greater area of the southern United States than is currently occupied. Its may be capable of colonising some areas unsuitable for *S. invicta*.

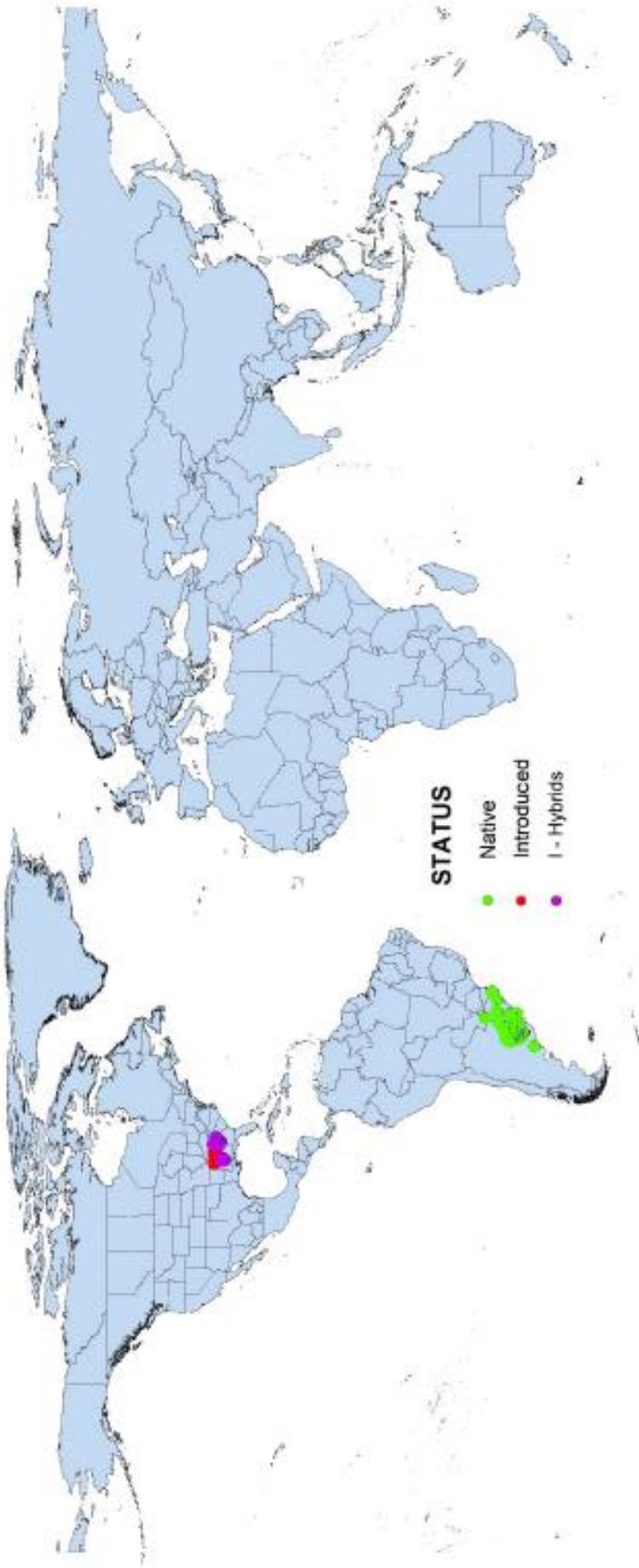
Mitigating factors

Not intercepted at the New Zealand border. Very similar to *Solenopsis invicta*, but with reduced pathways for spread to New Zealand due to restricted US distribution. Existing surveillance and response plans to *S. invicta* will likely directly transpose to this species.

Control Technologies

Baiting and direct nest treatment methods used against *S. invicta* (and reviewed in detail elsewhere – Williams et al. 2001; Vanderwoude et al. 2003) should be used to control this species. Phorid flies being investigated as biocontrol agents, particularly for *S. invicta* (Vogt & Streett 2003) but there are also species that prefer *S. richteri* (Porter & Briano 2000). There is also research into the potential of pathogens for fire ant control (e.g. Briano et al. 1995d).

Compiled by Richard Harris & Jo Berry



Global distribution of *Solenopsis richteri richteri* Forel