**Linepithema humile** (insect)

**Taxonomic name:** *Linepithema humile* (Mayr, 1868)

**Synonyms:** *Iridomyrmex humilis* (Mayr, 1868)

**Common names:** Argentine ant (English), Argentinische Ameise (German), formiga-argentina (Portuguese-Brazil)

**Organism type:** insect

*Linepithema humile* (the Argentine ant) invades sub-tropical and temperate regions and is established on six continents. Introduced populations exhibit a different genetic and social makeup that confers a higher level of invasiveness (due to an increase in co-operation between workers in the colony). This allows the formation of fast growing, high density colonies, which place huge pressures on native ecosystems. For example, *Linepithema humile* is the greatest threat to the survival of various endemic Hawaiian arthropods and displaces native ant species around the world (some of which may be important seed-dispersers or plant-pollinators) resulting in a decrease in ant biodiversity and the disruption of native ecosystems.

**Description**

Argentine ant (*Linepithema humile*) workers are monomorphic, displaying no physical differentiation (Holway et al. 2002a). The workers of this species are small, medium to dark brown ants, reaching 2 to 3mm in length. Body surface is smooth and shiny and lacks hairs on the dorsum of the head and thorax. The petiole is composed of a single, scale-like segment, and sting is absent. Workers are extremely fast moving and industrious, often recruiting in high numbers.

Please click on AntWeb: *Linepithema humile* for more images and assistance with identification. The AntWeb image comparison tool lets you compare images of ants at the subfamily, genus, species or specimen level. You may also specify which types of images you would like to compare: head, profile, dorsal, or label.

Please see PaDIL (Pests and Diseases Image Library) Species Content Page Ants: Argentine ant for high quality diagnostic and overview images.

Please follow this link for a fully illustrated Lucid key to common invasive ants [Hymenoptera: Formicidae] of the Pacific Island region [requires the most recent version of Java installed]. The factsheet on *Linepithema humile* contains an overview, diagnostic features, comparison charts, images, nomenclature and links. (Sarnat, 2008)

**Occurs in:**

agricultural areas, coastland, natural forests, planted forests, range/grasslands, riparian zones, ruderal/disturbed, scrub/shrublands, urban areas, wetlands

**Habitat description**

The physical environment may highly influence the suitability of a given habitat for a competitively dominant invader such as the Argentine ant (*Linepithema humile*) (Holway 2002b). The optimal environment for Argentine ants is characterised by moderate temperatures and moisture levels. In arid regions, including the fynbos of South Africa and the scrublands of California, invasiveness is limited by temperature, as Argentine ants are less temperature tolerant than native ants (Witt and Giliomee 1999,
Temper 1976, in Holway 2002b). In field trials foraging activity ceases at around 40°C - 44°C, with maximum foraging occurring 34°C (Holway 2002b). Moisture gradients also regulate invasiveness; Argentine ants generally penetrate further into mesic (moist and green) habitats than into xeric habitats (dry and sparse). For example, evidence from California has shown that Argentine ants disperse faster near perennial streams than near intermittent streams. (Holway 1998, in Holway 2002b).

Some abiotic factors are known to potentially regulate Argentine ant invasiveness; in Australia the large biodiversity of the ant genus *Iridomyrmex* confers a certain level of natural resistance to some habitats (Majer 1994, Andersen 1997, and Hoffmann et al. 1999, in Holway et al. 2002a). Humans predispose habitats to Argentine ant invasion as they create mesic habitats within arid zones through the modification of land. For example, in San Diego, runoff resulting from irrigation and human dwellings increases natural runoff by more than four-fold (Holway 2002b). This forms habitats more suitable to Argentine ant colonisation, indirectly opening up environments to ant invasions. A study by Suarez, Bolger, and Case (1998), conducted in California, showed the Argentine ant to be more abundant near developed areas.

**General impacts**


*L. humile* is a dominant ant and an aggressive competitor. It has displaced native ant species in an ecologically sensitive area in Spain (Carpintero et al. 2005) and has been associated with local extinctions of native ants in California (Suarez Bolger and Case 1998). Californian ants that are especially sensitive to displacement are army ants (*Neivamyrmex* spp.) and harvester ants (genera *Messor* and *Pogonomyrmex*), both of which are important ecosystem regulators (Suarez Bolger and Case 1998). *Monomorium* species, such as *M. ergatogyna*, may persist because of their chemical defences or their tolerance of higher temperatures (Holway 1999, Adams and Traniello 1981, Andersen et al. 1991, in Holway et al. 2002a). In introduced regions *L. humile* may be displaced by the red imported fire ant (*Solenopsis invicta*), another invasive ant (Holway et al. 2002a).

Invasive ants have a great potential to alter ecosystem processes, including ant-mediated seed dispersal or plant pollination. In California the removal of seeds produced by the myrmecochorous (ant-dispersed) tree poppy *Dendromecon rigida* is less in areas inhabited by the Argentine ant (*L. humile*) than in areas inhabited by the common harvester ant (*Pogonomyrmex subnitidus*) (Carney et al. 2003). A similar outcome has occurred in the South African *fynbos*, where the displacement of large native ants by *L. humile* has lead to a reduction in the dispersal of large ant-dispersed seeds and a reduction in the reproduction of those plants (Christian 2001, Holway et al. 2002a).

Native arthropods are greatly threatened by Argentine ants. In South Africa, the Argentine ant can collect up to 42% of available nectar before bees can forage (Buys 1987, in Holway et al. 2002a). In Hawaii the Argentine ant reduces numbers of many native arthropods, including essential pollinators (Cole et al. 1992, in Krushelnycky et al. 2004), the loss of which could threaten insect-pollinated plants such as the endangered “silversword” (see *Argyroxiphium* in IUCN Red List of Threatened Species).

Please follow this link for a summary of the general impacts of invasive ants: Inv*asive ants impacts* compiled by the ISSG.

**Notes**

The change in the structure of Argentine ant (*Linepithema humile*) colonies in introduced populations (i.e. in non-native regions) is due to the genetic makeup of such colonies (Tsutsui et al. 2000; Tsutsui and
Suarez 2003). These “uniclonal” colonies consist of workers that lack internest aggression, allowing workers to co-operate together as one supercolony, optimising foraging range and efficiency. This trait is greatly advantageous and allows ant colonies to attain high local densities and dominate ecosystems rapidly (McGlynn 1999; Holway et al. 2002a; Ness and Bronstein 2004). The mechanisms required for workers to recognise workers from a different colony are believed to be dependant on genetic mechanisms (i.e. differences). Researchers believe that because introduced populations have a lower level of genetic diversity compared with parent populations (due to having experienced a “population bottle-neck”) there is insufficient genetic diversity between workers for ants to be able to recognise workers as belonging to a different colony (Tsutsui et al. 2000). It has been suggested that the introduction of new alleles into introduced populations could increase genetic differentiation sufficient to trigger intraspecific aggression (which would alter colony structure, leading to a decrease in ant densities). On the other hand, populations with low levels of genetic diversity have underlying inherent traits that reduce adaptive ability in the long run and this control method may prevent the natural break-down of uniclonal colonies over time (Tsutsui et al. 2000).

Geographical range
Native range: The Argentine ant (Linepithema humile) is native to mesic subtropical or mesic mild-temperate regions of northern Argentina (Tsutsui et al, 2001, in Holway 2002b).
Known introduced range: Argentine ants now occur throughout the world, with at least 28 separate introductions known from six continents and many oceanic islands. Although new records continue to accumulate many populations were established before the 1950s (Suarez Holway and Case 2001).

Introduction pathways to new locations
Forestry:
Military: Argentine ants were brought to Hawaii with troops in the Second World War (Passera 1990, in Earlham College 2002).
Natural dispersal: Winged dispersal of female reproductive forms is rare or absent and colonies reproduce by “budding” (the colony grows, radiating outwards and subsequently budding off into separate units). This greatly limits the potential for self-mediated long distance spread in comparison to colonies able to spread via flight. Species such as the Argentine ant that undergo colony reproduction solely by budding depend largely on human-mediated dispersal to colonise distant locations (Holway et al. 2002).
Nursery trade: The Argentine ant generally does not invade native ecosystems in tropical or cold climates but it may survive in such climates in climate-controlled buildings such as greenhouses; in such a case local spread is restricted but the population is a potential source for further infestations (McGlynn 1999; Holway et al. 2002a).
Road vehicles (long distance): Nest fragments may be moved by transport vehicles. Colony establishment may be achieved by relatively small propagules, with as little as a single queen and 10 workers required for the establishment of a new colony (Hee et al. 2000).
Seafreight (container/bulk): Argentine ants were commonly found in cargo coming from California in the early part of the 20th century (Zimmerman 1941, in Earlham College 2002). For example, early this century it was noted that nearly every one of over 100 steamships landing between New Orleans and Baton Rouge, Louisiana, was heavily invested with Argentine ants (Newell and Barber 1913, Barber 1916, in Suarez Holway and Case 2001).

Local dispersal methods
Natural dispersal (local): Winged dispersal of female reproductive forms is rare or absent and colonies reproduce by “budding”. In northern California L. humile has been reported to spread 15 - 270 metres per year. The two Argentine ant supercolonies in Haleakala National Park (Hawaii) are rapidly advancing at rates of 25 – 150 m/yr (Unpubl. Data, in Krushelnycky et al. 2004).
On animals (local): In Doñana National Park (Spain) black kites (Milvus migrans) nesting in infested trees have been implicated in the spreads of Argentine ants, as they often feed in dumps infested with Argentine ants (Carpintero et al. 2005).
Road vehicles: Nest fragments may be moved by transport vehicles. Colony establishment may be achieved by relatively small propagules, with as little as a single queen and 10 workers required for the establishment of a new colony (Hee et al. 2000).

Road vehicles: The presence of humanised areas and roads have both been correlated with Argentine infestations in Doñana National Park, Spain (Carpintero et al. 2005).

Transportation of habitat material (local): Argentine ants routinely move their nests, a lifestyle that facilitates the rapid colonisation of items such as potted plants or refuse, which may then be distributed by humans (Tsutsui and Suarez 2003).

Water currents: The Argentine ant “rafts” in response to flooding, allowing it to live in watered urban environments (Holway et al. 2002). Flooding may stimulate local ant dispersal.

Management information
Preventative measures: The Pacific Ant Prevention Programme is a proposal prepared for the Pacific Plant Protection Organisation and Regional Technical Meeting for Plant Protection. The plan aims to prevent the red imported fire ant and other invasive ant species with economic, environmental or social impacts from establishing within, or spreading between, countries in the Pacific.

Please see Linepithema humile information sheet, prepared as part of ‘The invasive ant risk assessment project’, Harris et al. 2005, for Biosecurity New Zealand by Landcare Research.

Hartley et al. (2006) modelled the potential future range of the Argentine ant. They found that it is most likely to occur where the mean daily temperature in mid-winter is 7-14°C and maximum daily temperatures during the hottest month average 19-30°C. Uninvaded regions considered vulnerable to future establishment include: southern China, Taiwan, Zimbabwe, central Madagascar, Morocco, high-elevation Ethiopia, Yemen and a number of oceanic islands.

Integrated management: The potential of invasive ants to reach high densities is greater in human-modified ecosystems; particularly in land intensely utilised for primary production. For example, L. humile reaches high densities in agricultural systems, such as citrus orchards, that host Homopteran honey-dew producing insects (Armbrecht and Ulloa-Chacón 2003; Holway et al. 2002a). Improved land management, including a reduction in monoculture and an increase in the efficiency of primary production, may help prevent ant population explosions, alleviate the problems caused by high densities of ants and reduce sources of ant infestation.

Please follow this link for more detailed information on the management of the Argentine ant Linepithema humile compiled by the ISSG.

Nutrition
In Argentina, the Argentine ant (Linepithema humile) is commonly referred to as the sugar ant: a fitting name given its preference for sweet substances (Newell and Barber 1913, in Holway et al. 2002a). In line with this observation, baiting trials suggest that L. humile considers carbohydrate-rich resources such as honey or water equally, if not more attractive than protein-rich resources (Ness and Bronstein 2004). However, the ant has an overall generalised diet (similar to other invasive ants), including nectar, insects, carrion and honeydew secreted by Homopteran insects (Woodworth 1908, Horton 1918, Mallis 1942, Flanders 1943, Creighton 1950, Markin 1970a, in Suarez Bolger and Case 1998).

Reproduction
Sexual, haplodiploid system. Although the workers of all invasive ants are sterile, the Argentine ant (Linepithema humile) can rear eggs and early instar larvae into sexuals in the absence of queens. It is not known whether orphaned colonies of other invasive ants are able to develop into reproductive viable colonies despite the absence of a queen (Holway et al. 2002a).

Lifecycle stages
Virgin queens are believed to mate in the nest and disperse through budding rather than participating in a nuptial flight, resulting in the formation of large, many-queened, cooperating unicolonies (Markin, 1968). Queens may be killed by workers after one year and replaced by newly mated queens (Markin, 1970; Keller et al., 1989).

This species has been nominated as among 100 of the "World's Worst" invaders

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