# Records of a new pest ant species in Belgium, *Technomyrmex vitiensis* MANN, 1921

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## Abstract

The first records of the tramp ant *Technomyrmex vitiensis* MANN, 1921 in Belgium are reported. In February 2008 workers of this species were collected in a greenhouse at the Zoo Paradisio. In January 2009, workers of this species were collected in three greenhouses of the Botanical Garden of the Ghent University. There *T. vitiensis* is causing problems through aphid gardening by huge and persistent ant colonies. Probably this species raises the same problems in other Botanical greenhouses in Belgium. Comments on its geographical range and distribution in nearby countries, how to recognise this species and further information on behaviour, colony structure and management are given. Probably this species is regularly introduced by human transport of plants among greenhouses in Belgium, and we assume that there is a high possibility that more *T. vitiensis* records and problems in greenhouses elsewhere will be reported in the near future.

**Keywords:** *Technomyrmex vitiensis*, first record, Belgium, pest control

## Introduction

Last years various so called invader and/or tramp ant species were reported in heated buildings all over Belgium (DEKONINCK, 2008) and the Netherlands (BOER & VIERBERGEN, 2008; BOER & BROOKS, 2009). Most of these species are cosmopolitan and mostly transported by humans. In most cases plant- and flowerpots or building material are the main ways of transport. Some of these tramp ant species (*Hypoponera schauinslandi* (EMERY, 1899), *Hypoponera punctatissima* (ROGER, 1859) and *Monomorium pharaonis* LINNAEUS, 1758 (at present commonly found in all types of buildings) were reported for the first time in Belgium, already more than 100 years ago by BONDROIT (1911). Others were only recently added to the Belgian ant list: *Lasius neglectus* VAN LOON, BOOMSMA & ANDRÁSFALVY, 1990 (two localities; Ghent inside buildings of the Gent University, the Citadelpark and city of Flémalle), *Linepithema humile* (MAYR, 1868) (two records in greenhouses), *Tetramorium bicarinatum* (NYLANDER, 1846) (so far two localities) and *Tapinoma melanocephalum* (FABRICIUS 1793) (one record near Liège). Besides *L. neglectus* and *H. punctatissima* all these in Belgium introduced ant species have so far only been found inside heated buildings (DEKONINCK *et al.*, 2002; 2003; 2006a,b).

All these ant species are human-introduced species. Only a few of them are at present known as real pest species when occurring nearby humans: especially *M. pharaonis*, *L. neglectus* and in a lesser extent *Tapinoma melanocephalum* and *Linepithema humile* cause problems nowadays but so far only at a local scale. In most of the cases the problems are minor and negligible and most of their annoying character is only the result of overreacting of the people who are confronted with them. However some of them indeed deserve the status of pest species.

In January, February and April 2008 workers of *T. vitiensis* were collected in a greenhouse at the Zoo Paradisio during several excursions of the working group Walbru. In the winter of 2008 the curators of the Botanical garden of the Ghent University mentioned problems with persistent nuisance by ants in most of the greenhouses. Because of this, a detailed ant survey of the greenhouses was conducted in January 2009 and revealed the presence of *T. vitiensis* (BOLTON, 2007) in very high densities in most of the warm and wet greenhouses of the Botanical Garden.

## First records of *Technomyrmex vitiensis* in Belgium

### Material examined:

- 7 workers, collected in a greenhouse of the Zoo Paradisio on 17-I-2008 by WalBru (leg: D. IGNACE & P. WEGNEZ, col. RBINS).
- 20 workers, collected in three greenhouses of the Botanical Garden of the Ghent University (Prov. Eastern Flanders), (leg. 27-I-2009, W. DEKONINCK, col. RBINS).

In Ghent many small to medium sized black ants foraging in tight trails were collected in different greenhouses. Foragers were found on vegetation and while tending honeydew-producing insects as well as visiting flowers of orchids. In the greenhouses *T. vitiensis* nests were situated at or above ground level in numerous locations inside the heated greenhouses. Nests are frequently found in trees and bushes, tree holes, under palm fronds and old leaf boots, under leaves on trees, in loose mulch, under debris, in leaf-litter and even on the plastic plant name boards. Nests were almost everywhere in the greenhouses and since all neighbouring colonies seem to be interconnected, it was difficult to determinate the limits of a single nest, colony or population.

*T. vitiensis* was the dominant ant species in the visited greenhouses in Ghent, where also *L. neglectus* was found but only in small numbers. The latter pest ant species has spread and settled mainly outside the greenhouses and in the buildings of the nearby University and Museum S.M.A.K. as well as the Citadel park where it the single ant species (DEKONINCK *et al.*, 2002; 2007).

## Presence of *T. vitiensis* in nearby countries

In the Netherlands *T. vitiensis* has often been recorded in greenhouses and animal residences in zoos recently, and according to BOER & VIERBERGEN (2008) the speed at which *T. vitiensis* has conquered the heated greenhouses in the Netherlands is nevertheless unprecedented.

## Identification and distinction from other pest ant species

*Technomyrmex vitiensis* is a medium small (2.5-3 mm long), black to brownish-black ant with yellowish-white tarsi (feet). As a member of the subfamily Dolichoderinae, *T. vitiensis* has five abdominal segments, 12-segmented antennae, few erect hairs, and no sting. *Technomyrmex* species can be confused with the Argentine ant, *Linepithema humile*, however, the petiole of the Argentine ant has a vertical projection that is lacking on *T. vitiensis*. Moreover workers of the latter look blacker and stouter than Argentine ants although they are similar in size and foraging behaviour. Distinguish *T. vitiensis* from its sibling species *Technomyrmex albipes* (SCHMIDT, 1861) is not so easy (BOLTON, 2007). The most important discriminating characteristic is the shape of the mesonotum (see pictures in BOLTON, 2007) and the pairs of setae on the pronotum (*T. vitiensis* one pair of setae; *T. albipes* two pairs of setae).

## Ecology, foraging, feeding and reproduction

### *Natural habitat description*

In its native biogeographicallyrange *T. albipes and T. vitiensis are* scavengers that tramp and exploit forests and open habitats. Tent-like nests from *T. albipes* made from debris (TENBRINK & HARA, 2002) are found in dry places above the ground, mainly in trees, bushes, under palm fronds, in loose mulch, leaf litter, rotting logs, under loose bark, and sometimes under stones (WARNER *et al.*, 2002).

As well in its native range and worldwide elsewhere where they were introduced, both species can be found indoors searching for food and water, often forming long foraging lines. Indoor nests are often found in wall cavities and attics (WARNER & SCHEFFRAHN, 2004).

### *Foraging*

*Technomyrmex vitiensis* can form large colonies with numbers ranging from 8,000 to 3,000,000 in one colony, making them very difficult to control and eradicate. While in motion, workers raise their abdomen and lay trail pheromones so that nestmates may be recruited to help when resources are located. On structures, foragers follow lines and edges, usually going in straight lines.

### *Feeding behaviour*

Workers of *Technomyrmex* species as the white-footed ant *Technomyrmex albipes* and *T. vitiensis* feed on plant nectars and honeydew produced by many sap-sucking insects such as aphids, mealybugs, and scales. *T. albipes* is known to protect honeydew producers, which has caused problems in agricultural production in some areas of the world. In Sri Lanka *T. albipes* is known to play a major role in spreading the pineapple wilt disease due to their tending of the pink mealybug, *Dysmicoccus brevis* (COCKERELL, 1893) (SULAIMAN, 1997). In South African citrus orchards, this species causes localized outbreaks of red scale *Aonidiella aurantii* (MASKELL, 1879) (SAMWAYS *et al.*, 1982). CHARLES (1993) reports *T. albipes* when tending mealybugs *Pseudococcus longispinus* (TARGIONI & TOZZETTI, 1867) in citrus and persimmon orchards. On the other hand, WAY *et al.*, (1989) report that white-footed ants help control a pest of coconut in Sri Lanka, the coconut caterpillar, *Opisina arenosaella* WALKER, 1864 by feeding on the caterpillars' eggs.

Although both *Technomyrmex* species are strongly attracted to sweet foods, workers will also feed on dead insects and other protein sources. Frequently these species find their way inside wall voids where workers follow electrical cables and emerge into various rooms, especially kitchens and bathrooms, where liquid and solid foods can be encountered resulting in heavy trailing activity.

### *Reproduction and lifecycle stages*

We assume that the reproduction and evolutionary success of *T. vitiensis* are similar to that of *T. albipes*. The key to the evolutionary success of *T. albipes* is its high fecundity, especially considering that it doesn't have the obvious defensive capabilities of many other ants such as a venomous sting, chemical sprays, or soldiers with strong, biting mandibles. Nearly half of the entire colony is composed of fertile, reproductive females called intercastes (BOLTON 2007). In each colony 3 different female types are found. Queens are females that have wings. Intercastes are wingless females with a spermatheca, making them sexually viable. Workers are wingless females without a spermatheca (HARRIS *et al.* 2005).

Brood (eggs, larvae, and pupae) of *T. albipes* begin to develop under the care of the founding queen and the nest population increases. The dealate queen is eventually replaced by the intercastes, which can form further new colonies by a process called budding in which the intercastes leave the old colony with other nestmates and brood to establish a new nest site (YAMAUCHI *et al.*, 1991). This is probably also the case for *T. vitiensis* (BOLTON, 2007).

## Management and control of the infestation: another potential pest ant for greenhouses in Belgium?

The unusual colony structure of *T. vitiensis* allows them to reproduce rapidly, especially under warm weather, reaching millions of individuals in some locations. Eradication of this species and *T. albipes* is difficult as chemical poisons are not transferred among workers. No surface or residual treatments with liquid insecticides have yet been found to be effective for controlling these ants. Management has only been accomplished by treating infested homes with baits containing borates. Laboratory tests and field experiments have shown baits to be the only effective management method to date for white-footed ant control (WARNER, 2003; 2005). Since liquid baits tend to slowly dry out, it is important that fresh baits are always available until the target population has been controlled. Although bait toxicants may not be orally transferred among workers, they can still kill enough workers to cause death of brood by starvation (WARNER & SCHEFFRAHN, 2004; 2005). In addition, it is also thought that very slow acting bait toxicants may, with time, end up in the trophic eggs (WARNER & SCHEFFRAHN, 2004; 2005). Residual and systemic sprays to vegetation surrounding structures can also help by eliminating honeydew producing insects.

A key aspect of *Technomyrmex* sp. control involves trimming trees and shrubs surrounding the structure to stop ants from "bridging" (trailing from the vegetation onto the structure). The best policy is to trim large trees infested with *T. vitiensis* and to stop "leaf nests" from falling onto roofs which can cause reinfestation of the building. The use of Maxforce Quantum Gel can be an option to eradicate small populations. However human transport by pot plants from one greenhouse to another – at present from the greenhouses of Ghent to other greenhouses – should be done only after careful examination of the pots.

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**References**

BOER P. & VIERBERGEN B., 2008. - Exotic ants in The Netherlands (Hymenoptera: Formicidae). *Entomologische Berichten*, 68: 121-129.

BOER P. & BROOKS M., 2009. - Succesvolle buitenshuis vestigingen van de Argentijse mier *Linepithema humile* in Nederland (Hymenoptera: Formicidae). *Nederlandse Faunistische Mededelingen*, 31: 17-24.

BOLTON B., 2007. - Taxonomy of the dolichoderine ant genus *Technomyrmex* Mayr (Hymenoptera: Formicidae) based on the worker caste. *Contributions of the American Entomological Institute*, 35 (1): 1-150.

CHARLES J.G., 1993. - A survey of mealybugs and their natural enemies in horticultural crops in North Island, New Zealand, with implications for biological control. *Biocontrol Science and Technology*, 3: 405-418.

DEKONINCK W., DE BAERE C., MERTENS J. & MAELFAIT J.-P., 2002. - On the arrival of the Asian invader ant *Lasius neglectus* in Belgium (Hymenoptera: Formicidae). *Bulletin S.R.B.E./K.B.V.E.*, 138: 45-48.

DEKONINCK W., VANKERKHOVEN F. & MAELFAIT J.-P., 2003. - Verspreidingsatlas en voorlopige Rode Lijst van de mieren van Vlaanderen. Rapport van het Instituut voor Natuurbehoud 2003.07. Brussel 191 pp.

DEKONINCK W., MAELFAIT J.-P., VANKERCKHOVEN F., BAUGNÉE J.-Y., & GROOTAERT P., 2006. - An update of the checklist of the Belgian ant fauna with comments on new species for the country (Hymenoptera, Formicidae) *Belgium Journal of Entomology*, 8: 27-41.

DEKONINCK W., WEGNEZ P., ESPADALER X. & GROOTAERT P., 2006. - First record of infestation of the ghost ant *Tapinoma melanocephalum* (FABRICIUS, 1793) in Belgium (Hymenoptera, Formicidae) – a new indoor pest problem for the country? *Bulletin S.R.B.E./K.B.V.E.*, 142: 25-28.

DEKONINCK W., LOCK K. & JANSSENS F., 2007. - Acceptance of two native myrmecophilous species, *Platyarthrus hoffmannseggii* and *Cyphoderus albinus* by the introduced invasive garden ant *Lasius neglectus* in Belgium. *European Journal of Entomology*, 104(1): 159-161.

DEKONINCK W., 2008. - Distribution, ecology and conservation of ants in Belgium with emphasis on Flanders. PhD Ghent University.

DEYRUP M., 2003. - An updated list of Florida ants (Hymenoptera: Formicidae). *Florida Entomologist*, 86: 43-48.

HARRIS R., ABBOTT K., BARTON K., BERRY J., DON W., GUNAWARDANA D., LESTER P., REES J., STANLEY M., SUTHERLAND A. & TOFT R., 2005. - Invasive ant pest risk assessment project for Biosecurity New Zealand. Series of unpublished Landcare Research contract reports to Biosecurity New Zealand. BAH/35/2004-1.

ROOM P., 1971. - The Relative Distributions of Ant Species on Ghana's Cocoa farms. *The Journal of Animal Ecology*, 40: 735-751.

SAMWAYS M.J., NEL M. & PRINS A.J., 1982. - Ants (Hymenoptera: Formicidae) foraging in citrus trees and attending honeydew-producing Homoptera. *Phytophylactica*, 14: 155-157.

SMITH F., 1861. - Catalogue of hymenopterous insects collected by Mr. A.R. Wallace in the Islands of Ceram, Celebes, Ternate, and Gilolo. *Journal of the Proceedings of the Linnean Society, Zoology*, 6: 36-48.

SUAREZ A., HOLWAY D. & WARD P., 2005. - The role of opportunity in the unintentional introduction of non-native ants. *PNAS*, 102: 17032-17035.

SULAIMAN S.F.M., 1997. - Impact of weed management on ant density and fruit yield in the control of pineapple wilt disease. *Acta horticulturae*, 425: 475-484.

TENBRINK V. & HARA A., 1992. - *Technomyrmex albipes*. Beaumont Reaserach Center. Available from: www.extento.hawaii.edu/kbase/crop/Type/technomy.htm

TSUJI K. & YAMAUCHI K., 1994. - Colony level sex allocation in a polygynous and polydomous ant. *Behavioral Ecology and Sociobology*, 34: 157-167.

YAMAUCHI K.T., FURUKAWA T., KINOMURA K., TAKAMINE H., TSUJI K., 1991. - Secondary polygyny by inbred wingless sexuals in the dolichoderine ant *Technomyrmex albipes*. *Behavioral Ecology and Sociobology*, 29: 313-319.

WARNER J., 2003. - Bait preferences and toxicity of insecticides to white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae). Univ. of Florida, Masters Thesis.

WARNER J., 2005. - Arboreal bioassays testing toxicity of insecticides and rubidium marking of white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae). Univ. of Florida, PhD Dissertation.

WARNER J., CABRERA B.J. & SCHEFFRAHN R.H., 2002. - White-footed ant, *Technomyrmex albipes* (Fr. Smith). UF/IFAS Featured Creatures. EENY-273.

WARNER J. & SCHEFFRAHN R.H., 2004. - Feeding preferences of white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae), to selected liquids. *Sociobiology*, 44(2): 403-412.

WARNER J. & SCHEFFRAHN R.H., 2005. - Laboratory evaluation of baits, residual insecticides, and an ultrasonic device for control of white-footed ants, *Technomyrmex albipes* (Hymenoptera: Formicidae). *Sociobiology*, 45(2): 317-330.

WAY M.J., CAMMELL M.E., BOLTON B. & KANAGARATNAM P., 1989. - Ants as egg predators of coconut pests, especially in relation to biological control of the coconut caterpillar, *Opisina arenosella* Walker, in Sri Lanka. *Bulletin of Entomological Research*, 79: 219-233.

WETTERER J., 1997. - Ants on *Cecropia* in Hawaii. *Biotropica*, 29(1): 128-132.

WETTERER J., 2002. - Ants of Tonga. *Pacific Science*, 56: 125–135.

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# Areaaluitbreiding en genetische verwantschapsanalyse bij de thermofiele mierensoort, *Lasius emarginatus* (OLIVIER, 1792)

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## Abstract

*Lasius emarginatus* (OLIVIER, 1792) is a thermophilic ant species native to western and central European regions that are characterised with a warm Mediterranean climate. We report a northern expansion of the distribution area in Western-Flanders (Belgium) since 2002. *Lasius emarginatus* nest were found in anthropogenic habitats around churches and in old calcareous brick walls. The nests were often characterised by the presence of *Asplenium ruta-muraria* L. and *Senecio vulgaris* L. and mostly found on the south and west side of the church where sunlight exposition is the highest. Preliminary research of genetic relatedness by means of microsatellites supports *L. emarginatus* to be a monogynous/monandric species that swiftly colonizes, in a random direction, new sites with the preferred microclimatic conditions. Large-scale sampling within this anthropogenic habitat and a more profound analysis of genetic relatedness in the future may reveal new insights into the northern expansion patterns of this species and its potential impact on the local fauna and flora.

**Keywords**: Formicidae, *Lasius emarginatus*, distribution, distribution area expansion.

## Samenvatting

*Lasius emarginatus* is een thermofiele mierensoort die van nature voorkomt in regio's van West- en Centraal-Europa met een eerder warm, Mediterraan klimaat. We melden hier de noordelijke uitbreiding van het areaal in West-Vlaanderen (België) sinds 2002. De nesten van *L. emarginatus* werden aangetroffen in antropogene habitatten meer bepaald rond kerken en in oude kalkrijke stenen muren. Typisch voor dit habitat was de aanwezigheid van *Asplenium ruta-muraria* en *Senecio vulgaris*. De nesten werden meestal gevonden langs de zuid- en westkant van de kerk waar direct invallend zonlicht het hoogst is. Voorlopig onderzoek naar de genetische verwantschap aan de hand van microsatellieten bevestigt dat *L. emarginatus* een monogyne, monandrische soort is, die snel en in willekeurige richting nieuwe sites met geschikte microklimatologische omstandigheden koloniseert. Een grootschalige nieuwe bemonstering van deze antropogene habitatten en een verder diepgaande analyse van de genetische verwantschap in de nabije toekomst kan nieuwe inzichten verschaffen in de patronen van de noordelijke areaaluitbreiding van deze soort alsook informatie opleveren over de potentiële impact van deze soort op de locale fauna en flora.