

A TEST METHOD FOR FIELD STUDIES OF INSECTICIDAL BAIT FORMULATIONS AGAINST THE ANT *LASIUS NIGER* (HYMENOPTERA: FORMICIDAE)

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Abstract—In the early spring *Lasius niger* may be a nuisance indoors. These ants often originate from nests right next to the foundation, below the house or sometimes even directly under the floor. The ants raise the humidity, which may result in severe damage to the woodwork, due to rot. The same applies to an even greater extent to other species: *L. umbratus* and *L. fuliginosus*.

The present method was developed for the evaluation of insecticidal bait formulations in the field. Special emphasis was put on maintaining the colony members' ability to communicate mutually. The study evaluated the response of *L. niger* to seven bait formulations, five containing azamethiphos, one containing chlorpyrifos, and a reference with no insecticide. The primary interest of the experiment was to develop a method where the palatability of the bait formulations, the ability of the baits to attract *L. niger*, and the ants' acceptance of the baits could be investigated.

Thirty-four ant nests were used. When the number of ants on a jam bait indicated high activity, the test was initiated. A new jam bait was put into position for fifteen minutes and then replaced by the test bait for fifteen minutes. This was repeated three times. The number of ants visiting each bait was counted, and a small portion was collected by a sucking device when leaving the bait. The latter was observed for up to 24 hours to estimate the mortality. The results with the reference bait showed that the ants were only slightly affected by the method, while the palatability of the test baits ranged from as good as the controls to complete repellence. This result was confirmed by the percentage of ants killed. And both results indicate that the method could be used to establish comparable data for the efficacy of ant baits.

INTRODUCTION

In Denmark, as in other North European countries, different species of ants have caused some problems in greenhouses, houses and gardens (Collingwood, 1979). The first time ants were reported to be a problem indoors in Denmark was in 1861 by Meinert. He reported that *L. niger* (*L.*) is sometimes a problem in houses in Copenhagen, but it might very well be a question of a change in the perception of ants as constituting a problem, which is registered in this context, rather than a new development. Based on the past 30 to 40 years of inquiries to the DPIL (Figure 1), there is no doubt that nuisance as well as actual damage caused by ant species such as *L. niger*, *L. umbratus* (Nylander) and *L. fuliginosus* (Latreille) must be considered a problem. Inquiries to the DPIL advisory service about *Lasius spp.* have stabilised at a level between 600 and a 1000 per year or 5 to 12 percent of all inquiries, and ants are always among the top three insect in the advisory service (Figure 1) (T. Hallas *et al.*, 1977; DPIL Ann.Rep. 1980–94).

When ants are considered to be more than a nuisance, it is to some extent linked to changes in the construction of modern houses. In the beginning of the sixties a method was introduced in Denmark according to which the floors in standard houses were constructed by placing a number of joists on top of a concrete deck with insulation in-between the joists and with wooden boards on top. A construction like this provides an ideal nesting site for the above-mentioned ant species (Arevad, 1987). The ants cause an increase of the humidity, which can give rise to severe damage. *L. umbratus* is able to build its nest by using the insulation directly. The queen often starts by invasion of and adoption in *L. niger* nests. The nest is formed into a cell-like structure often as big as a sq. meter. *L. fuliginosus* makes a carton nest out of decaying wood. *L. niger* in the house can originate from nests right outside the house or below the house, but also from decaying, damp wood wherever it appears inside the house or under the floor (Beck, 1991). Both *L. niger* and *L. fuliginosus* need some decaying wood to start with, but then they can keep up the humidity, and exacerbate the original damage. *L. niger* nests in greenhouses have been reported to damage attempts of biological control, as they were attacking eggs of the parasites used for aphids control (Tulisalo and Touvinen, 1975; Liepert and Dettner, 1993).

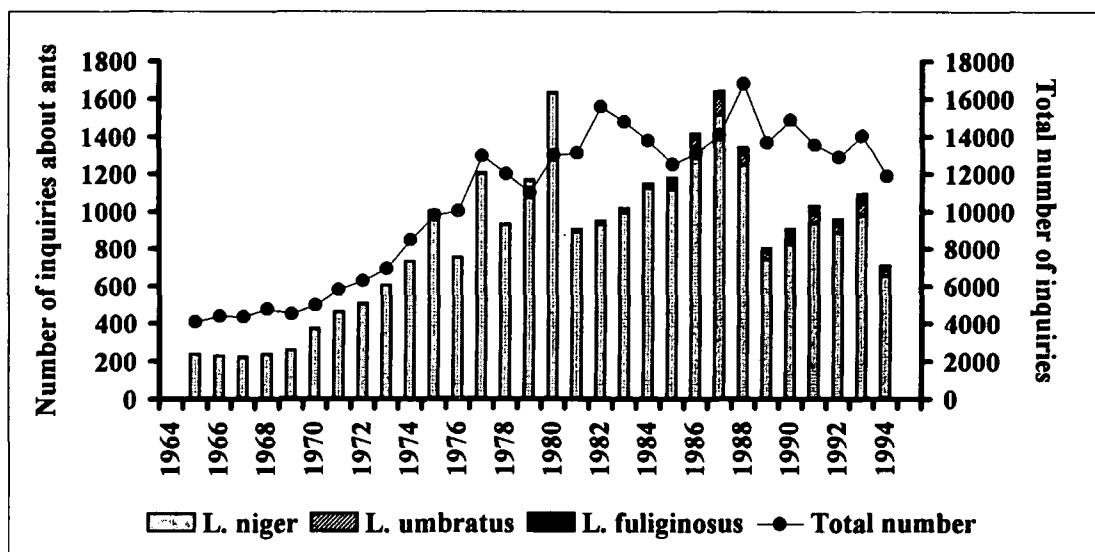


Figure 1. Total number of inquiries from 1965 to 1994 to the Danish Pest Infestation Laboratory, as well as inquiries concerning problems with *L. niger*, *L. umbratus* and *L. fuliginosus*.

In the period 1985 to 1995, 37% of all inquiries to the DPIL about problems with *L. niger* were made between January and April, when it is too cold or too difficult for the ants to find food and to be active outside (Arevad, 1987). The mean number in April was only surpassed by July when the ants are flying (Figure 2). The majority of all inquiries concerned the nuisance caused by ant invasions, while only a few concerned actual damage to constructions.

Nuisance as well as damage calls for some kind of control measures, and it is therefore necessary to be able to make efficacy tests which are as reliable as possible. For the time being it is difficult or probably impossible to do an efficacy tests with *L. umbratus* as it hardly ever deviates from its subterranean life, and is thus only identifiable when the queen and males are swarming in July and August or when dark spots are seen on wooden constructions in the house. Both *L. niger* and *L. fuliginosus* take sweet and fairly liquid food (Collingwood, 1979), and a number of insecticidal baits have been produced to control these ants. Due to the social structure of an ant colony it is difficult to make reliable tests, a fact which has had the unfortunate consequence that a number of efficacy tests of ant-baits have been done either in petri dishes in the laboratory or there have been

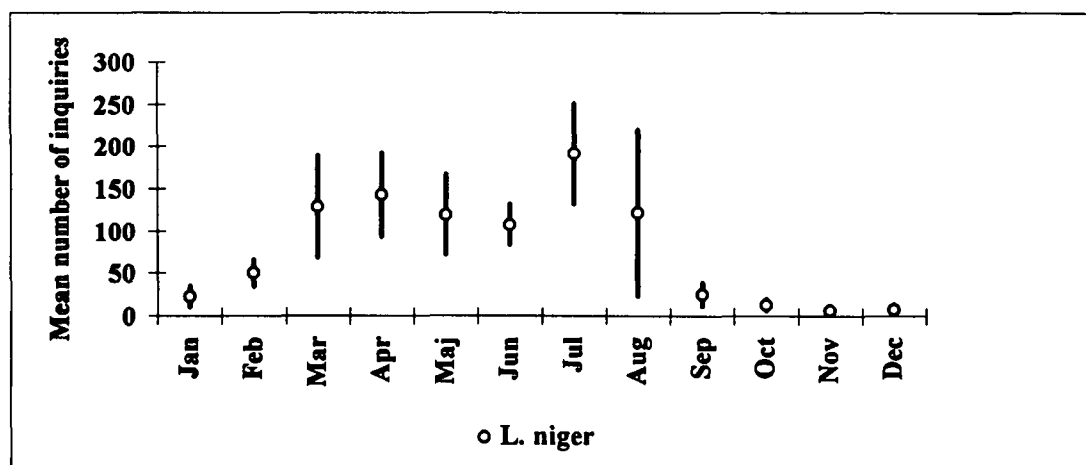


Figure 2. The mean number of inquiries per month to The Danish Pest Infestation Laboratory concerning problems with *L. niger*. The mean is based on the inquiries from 1985 to 1994.

