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***Reticulitermes urbis* in Bagnacavallo (Ravenna, Northern Italy):  
a 15-year experience in termite control**

**Abstract** - We relate and discuss the application of a monitoring-baiting program with the IGR hexaflumuron to termite control in Bagnacavallo (Ravenna, Northern Italy), where a massive *Reticulitermes urbis* infestation existed in the old town. Termite control was carried out in different zones over a period of 15 years, starting from the centre of the infested area and extending towards the peripheral areas. The treatment succeeded in eliminating termites from Bagnacavallo old town, using a total of 63 g of hexaflumuron.

**Key words:** IGR, Isoptera, monitoring-baiting program.

#### INTRODUCTION

A massive infestation, caused by the subterranean termite *Reticulitermes urbis* Bagnères & Clément, 2003, has been known in the old town of Bagnacavallo (Ravenna, Northern Italy) for the last 30-40 years. It is the largest termite infestation in urban environment ever reported in Europe, extending over 20 hectares.

The infestation was initially thought to be caused by *Reticulitermes lucifugus* Rossi, the only *Reticulitermes* species then known for Italy (Marini & Ferrari, 1998). Analyses based on chemical (cuticular hydrocarbons and defensive compounds of the soldiers) and genetic (mitochondrial DNA) characters later revealed the occurrence in Italy of another species (Clément *et al.*, 2001), that was described as *R. urbis* (Bagnères *et al.*, 2003). While *R. lucifugus* is found from northern Italy to the far south, *R. urbis* is found in the eastern side of Italy (Marini & Mantovani, 2002; Luchetti *et al.*, 2004). Outside Italy, *R. urbis* is distributed in South-East France (Clément *et al.*, 2001; Bagnères *et al.*, 2003), along the Adriatic coast of Croatia, and the Ionian coast of Greece, down to the southern coast of Peloponnese (Luchetti *et al.*, 2007).

In Bagnacavallo, *R. urbis* caused extensive damages to wooden structures and furniture in hundreds of buildings, including some of historical and artistic value. In the infested area there are eight churches and four monasteries, containing paints and woodwork of art. Termite presence was favored by the characteristics of the old town: Buildings were built in the 17<sup>th</sup>-20<sup>th</sup> centuries with unplastered brickwork; they are con

tiguous, aligned along the roads, and have internal gardens; the air circulation is limited and many walls have rising damp.

Control of subterranean termites of the genus *Reticulitermes* is difficult because of their cryptic nesting habits and of their biology, but can be successfully achieved by a monitoring-baiting program, using insect growth regulators (IGR) (Su & Scheffrahn, 1998).

The control program consists in three phases: monitoring for the evaluation of the infestation extent, treatment, and further monitoring for the detection of possible re-infestations. In the first phase, monitoring stations are placed in the infested area. Once termites are found in the stations, monitoring devices are replaced with baits (second phase). In the third phase, following the elimination of termites, monitoring resumes and bait is applied if new termite activity is detected (Su & Scheffrahn, 1998).

#### MATERIALS AND METHODS

Owing to economic and organizational problems, termite control was extended over 15 years, from 1995 to 2010. Termite control activities were carried out by SIREB s.a.s (Modena, Italy), in collaboration with the Department of Biology of the University of Bologna. Termite control started from the centre of the infested area (zone A) and extended progressively towards the peripheral areas of the old town (zones B and C).

For each zone, a three-phase program was executed. A preventive phase aimed to monitor termite presence and intercept termite colonies, by means of a net of monitoring stations containing wood or paper. On the whole, more than 1400 monitoring stations were installed in the old town, covering an area of 28 hectares, with a density of 0.5 stations per 100 m<sup>2</sup>. Monitoring stations were either placed in the ground (82%) or above ground in infested wood or on termite galleries (18%).

In the second phase, those stations that were attacked by termites were used for an intensive three-year treatment with IGR: In these stations, baits were placed consisting of a cellulose matrix soaked with the IGR hexaflumuron, a chitin synthesis inhibitor (CSI) that causes termites to die when they molt. Stations were inspected every 30-60 days and baits were replaced when needed.

The last phase was a post-treatment monitoring, extending until 2010, that aimed to evaluate possible reinfestations.

Zone A consisted of two groups of buildings, including a church and a cloistered monastery, that were the first to be treated (from 1995 to 1997) because of the extent of the damage to the furniture and woodwork of art. Afterwards, following the increased awareness of the problem among the inhabitants of Bagnacavallo, and the consequent fund availability, monitoring was extended to the surrounding portion of the old town (zone B), that was treated from 2004 to 2006. Finally, in the years 2006-2008, monitoring and treatment were extended to the remaining part of the old town (zone C).

## RESULTS AND DISCUSSION

The proportion of attacked stations varied among zones (32.5% in zone A, 31.3% in zone B, 9.2% in zone C). On the whole, twenty-three per cent of the stations were attacked by termites. Attacked stations were distributed on a surface of 20 hectares.

The treatment succeeded in eliminating termites from Bagnacavallo old town. After the three-year intensive program, termite activity remained almost absent, with very few reinfestations, that have been subsequently treated. In 2010, only two infested stations (out of 1400) were reported.

This result was obtained with a very small quantity of materials: 12,64 kg of treated cellulose were eaten by termites, corresponding to 63 g of hexaflumuron.

The effectiveness of IGRs in *R. urbis* control programs is also demonstrated by its application in Domène (Isère, France) where an urban infestation extending over nearly seven hectares has been successfully treated (Bagnères *et al.*, 2008; Leniaud *et al.*, 2009).

The complete eradication of termites from an area where favorable conditions for their presence continue to exist is probably an unreasonable expectation, but the experience reported here shows that a correct treatment can drastically reduce termite presence, preventing damages to private houses and buildings of historical and artistic value.

A constant monitoring activity is highly recommended for the timely detection and treatment of any possible reinfestation.

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