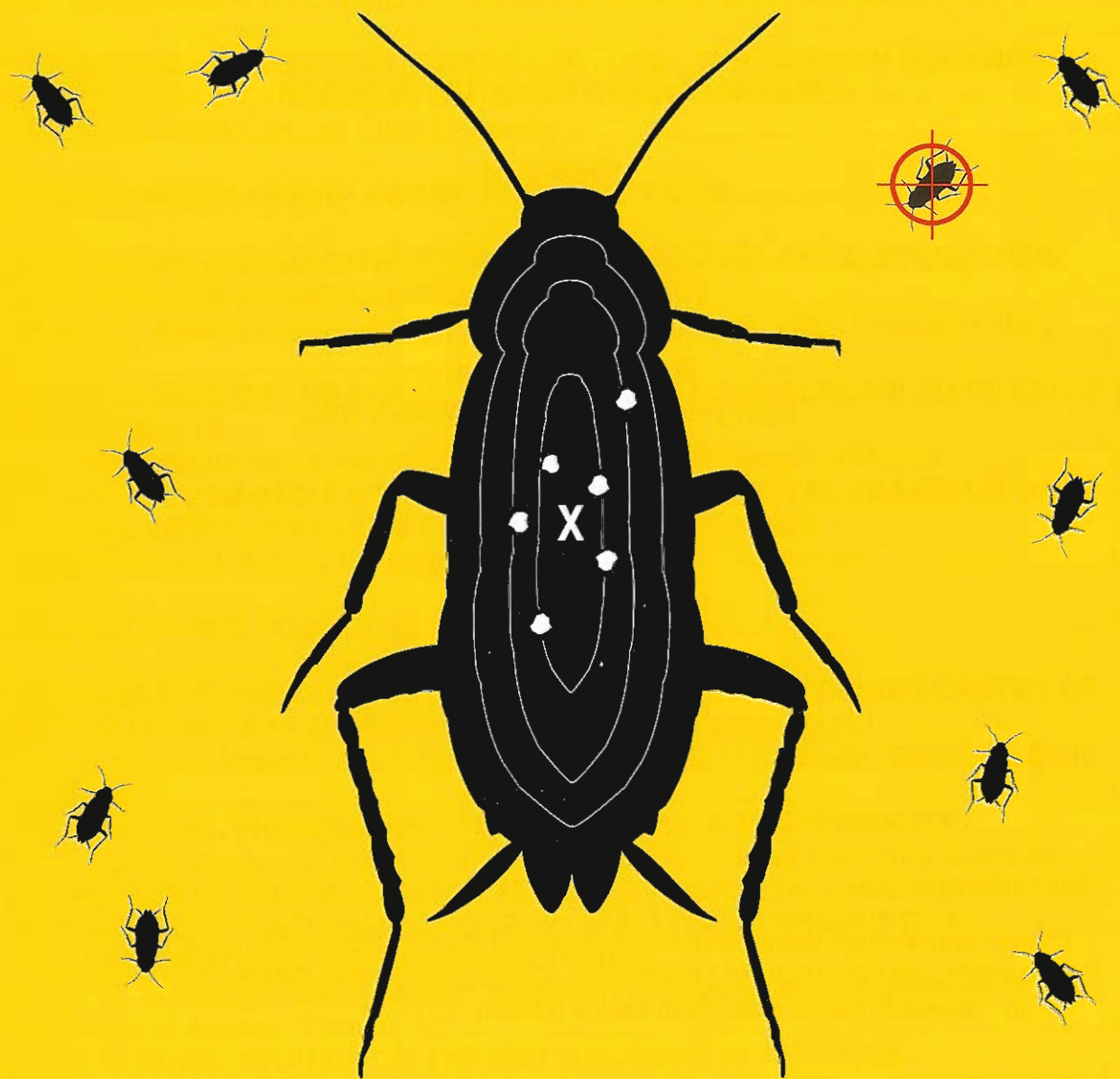


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do Heroísmo and Ponta Delgada), i.e. hot and humid. In view of the extent of the infestation, even with a massive fumigation effort, which would exceed disaster budget limitations, eradication at this point does not seem feasible. Since the Azores have had no previous termite problems, no termite control products are registered in Portugal and no local pest control companies have knowledge of termite control practices. Furthermore, the architecture is quite different from that in the US where tent fumigation is commonly practiced, with most houses within city blocks built wall to wall and with delicate tile roofs that would be dangerous for tenters to walk on. An initial project has been approved for 2006 to evaluate what control options should be implemented in the Azores, given architectural and cost constraints. Plans are underway to evaluate detection methods, wood surface treatments in attics, furniture treatment, spot treatments using drill and injection.

WHEN INVASIVES MEET: *COPTOTERMES FORMOSANUS* AND *COPTOTERMES VASTATOR* IN THE PACIFIC

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Coptotermes vastator Light (Isoptera: Rhinotermitidae) has an interesting history in the Pacific. Although it is the most serious termite pest in the Philippines and the Mariana Islands (including Guam) (Wang & Grace 1999, Yudin 2002), *C. vastator* was misidentified for many years in Guam as its notorious congener *Coptotermes formosanus* Shiraki (Su & Scheffrahn 1998). *Coptotermes vastator* was found infesting a single home, which was subsequently demolished during highway construction, on the island of Oahu, Hawaii, in 1963 (Bess 1966, 1970), but was not collected again in Hawaii until 1999 (Woodrow *et al.* 2001). All of the collections of *C. vastator* in Hawaii since 1999, have been within an approximately 10 km distance on the island of Oahu.

Although *C. formosanus* has been present in Hawaii for over 100 years, this species has not been confirmed to be present in Guam, where *C. vastator* is a serious pest. It is likely that *C. vastator* is more successful as an invader in the tropics, while *C. formosanus* enjoys a subtropical distribution. Shelton & Grace (2003) noted greater mortality of *C. vastator* than *C. formosanus* under desiccating conditions; and Grace *et al.* (2004) observed distinctly different tunneling patterns with these two species that suggested that *C. vastator* was more adapted to foraging in a tropical environment.

In comparative studies of these two termites species in Hawaii, Uchima & Grace (2003a,b) concluded that *C. vastator* had a lower feeding rate than *C. formosanus*, and generally smaller field colonies. When the two species were paired in the laboratory in agonistic assays, *C. vastator* generally suffered greater mortality (Uchima 2002).

However, neither species was consistently able to control a single food source when they were placed in direct foraging competition (Uchima 2002). Thus, in the subtropical regions of the world where *C. formosanus* has proven to be a successful invader, *C. vastator* appears to be at a disadvantage both from an environmental and a behavioral standpoint, but the advantage may shift towards *C. vastator* as one approaches the equator. One area where *C. vastator* has demonstrated an advantage over *C. formosanus* is in resistance to attack by the nematode *Heterorhabditis indica*, although the basis of this is not yet known (Mankowski *et al.* 2005). It is possible that the observed differences in cuticular hydrocarbons of these two *Coptotermes* species (Haverty *et al.* 2000) may influence both susceptibility to desiccation and nematode attachment.

A final point of interest with *C. vastator* is its taxonomic status. *Coptotermes vastator* is morphologically virtually indistinguishable from *C. havilandi* Holmgren (N.-Y. Su, personal communication), which is now considered a junior synonym of *C. gestroi* Wasmann (Kirton 2005, Kirton and Brown 2003). Although *C. vastator* has often been considered to be indigenous to the Philippines (Light 1929, Bantayan 2005), recent genetic analyses suggest that it may also be synonymous with *C. gestroi* (C.-Y. Lee, personal communication). Thus, either *C. gestroi* or a “*C. gestroi* complex” of closely related species enjoys a broad distribution in the tropics similar in extent to that of *C. formosanus* in the subtropics.

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PHYLOGENETIC ANALYSES, MOLECULAR DNA MARKERS AND THE STUDY OF INVASIVE SUBTERRANEAN TERMITES

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DNA marker technologies have been used extensively in subterranean termite population genetics (Atkinson & Adams 1997; Jenkins et al 2001; Austin et al. 2004; Vargo 2003). They provide more accurate insight into termite dispersal than mark release recapture (MRR), the assumptions of which have been violated in both field and lab studies (Evans et al. 1999; Forschler and Jenkins 1999). DNA markers have been applied under the aegis of cladistic and phenetic assumptions, to illuminate