Etxebeste I, Álvarez G, Sánchez-Husillos E & Pajares J, *Monochamus galloprovincialis* dispersal and the effective sampling area of operational traps. In: Schröder, T. (ed.), Pine Wilt Disease Conference 2013, pp. 18-19, Braunschweig, ISSN: 1866-590X

Monochamus galloprovincialis dispersal and effective sampling area of operational traps

Etxebeste I, Álvarez G, Sánchez-Husillos E & Pajares J

Sustainable Forest Management Research Institute, University of Valladolid – INIA 34004 Palencia, Spain

Email: inaki@goisolutions.net

ABSTRACT

The availability of an operational trapping system for *Monochamus galloprovincialis* (Olivier, Coleoptera: Cerambycidae), the European vector of the Pine Wood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer), has allowed the implementation of a reference tool for monitoring the presence and spread of the Pine Wilt Disease as well developing management methods based on mass-trapping of the vector. Furthermore, catch data gathered in traps can be potentially used in the study of *M. galloprovincialis* dispersal and the determination of absolute population densities. However, such applications require of the parameterization of dispersal models and detection functions that are in turn used to estimate values such as diffusion rates or the effective sampling area of traps (Turchin, 1998).

Two mark-release-recapture experiments carried out in 2009 and 2010 at two different pine stands in central-Spain were designed to describe such values. During the first trial, 174 unfed *M. galloprovincialis* imagoes were marked and released from the centre of a setup consisting of 28 traps distributed along four concentric rings at 50,100, 250 and 500m located on a natural *Pinus pinaster* stand (Figure 1A). A second study used a grid-based

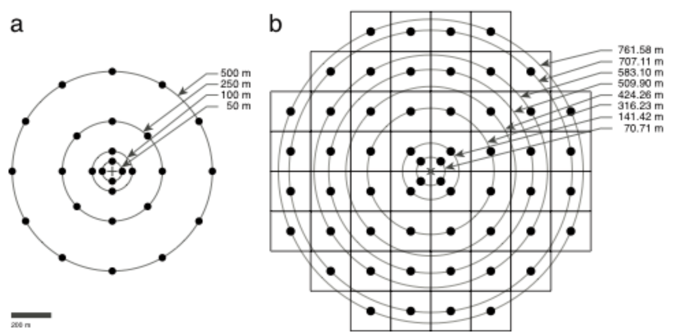

Figure 1. Experimental designs followed during *Monochamus galloprovincialis* dispersal studies in 2009 (a) and 2010 (b).

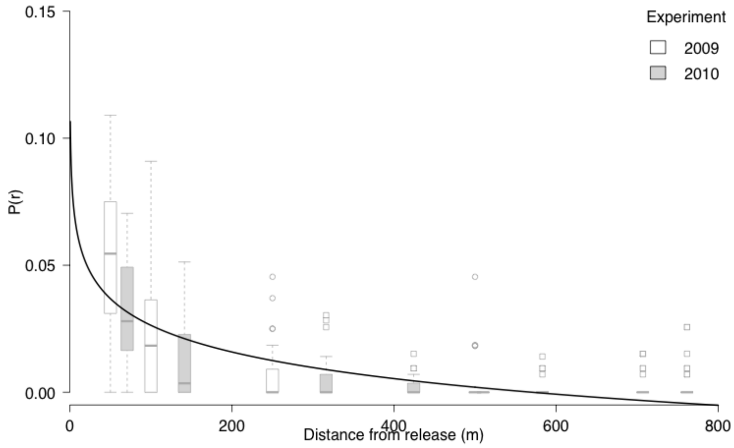

Figure 2. Proportions of recaptured *Monochamus galloprovincialis* [P(r)] at traps located a diverse distances from the release point (r) during field trials in 2009 and 2010 in Western Spain. The black line representes fitted linear regression for the estimated proportion of recaptures in relation to the common logarithm of the distance.

design with 56 traps that covered distances up to 761 m, to track the movement of 353 individuals (Figure 1B).

Up to 35 and 29% of released beetles were recaptured during 2009 and 2010 field experiments respectively. Values per each replicate during each experimental period were then modelled and the relationship between capture probability and distance to release point could be studied under different theoretical and empirical regression models (Turchin, 1998).

On the one hand, modeling of mean recaptures per distance under a simple diffusion model for time integrated data showed that about 50% of individuals do not dispers beyond 40 m. On the other hand, empirical fitting of proportion of recaptures allowed to set the effective sampling area for traps at ca. 0.77ha, while the seasonal sampling range at which the estimated proportion of the catch would be zero could be set to 570.44m (Figure 2; Ostrand & Anderbrant, 2003).

The variations in the estimates when using other modelling approaches are discussed, as well as the implications of the study of *M. galloprovincialis* dispersal on management decissions and the mmonitoring of its population density.

Keywords. Dispersal, Mark Release Recapture, Population Density, Baited Traps, Sampling Range

REFERENCES

Ostrand F; Anderbrant O (2003). From where are insects recruited? A new model to interpret catches of attractive traps. *Agricultural and Forest Entomology* 5, 163-171.

Turchin P (1998). *Quantitative analysis of movement : measuring and modeling population redistribution in animals and plants*. Sinauer Associates Inc: Sunderland, Massachusetts.