

Action C2.

Implementation and management of prevention, early warning, eradication and containment protocols in Circeo Park and surroundings

Deliverable:

Revised local management protocols and plans – Third update, 2022

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1. Summary

The monitoring program of the expansion of the beetles in the core areas took place as planned. The traps positioned according to the linear transept protocol, the Push and Pull and the X-Traps, all armed with the same mix of attractors, have proved the presence of *Xylosandrus* spp., but with a low level of infestation as regards the territory of the Circeo National Park, a sign that the techniques implemented in these years of the project have been successful.

To have a clear picture of the epidemiological situation of the populations of *Xylosandrus* spp. it has been necessary to carry out a continuous monitoring based on pheromone traps. In this respect, the setting of traps baited with attractive volatiles represents one of the most effective tools allowing to know which species occur on the territory, where they are present (geographical distribution), their numerical consistency (population density), the period of the year in which the flights occur (phenology), the temporal variations within the year (allowing to know the number of generations) and between years (which allows to follow the population dynamic).

This document lays down the protocols agreed for the management of the lure baited trapping network during 2022 in the Circeo National Park. It has been developed on the basis of the analyses of data collected during the 2021 campaign and takes into account the conclusions on selected lures and traps.

Considering the current infestation level and the imminent closure of the project, the protocols have been developed jointly by Circeo, UNITUS and TS, on the basis of joint agreements made in February 2022. These are:

- Linear transects
- X-trap installation

Circeo staff decided not to deploy Push and Pull because the number of captured beetles with this protocol has been very low in 2021. Moreover, with linear transept protocol it is possible to cover a broader area to monitor the invasion.

The protocols will be implemented from March onwards.

2. 2022 Linear Transect

The tests will involve linear transects of attractive traps placed at the same distances from each other. According to the data collected during 2021 monitoring campaign, the optimal distance in which the traps are positioned is 50 meters, all armed with the same mix of attractors near the most open areas.

The experiment will follow the same design for each of the target sites:

1. By late February, select in the forest (park) 5 clear cuts, or edges, long of 250 m.
2. By early March, deploy on each transect 5 traps placed at the same distances of 50m, and baited with the combination of the 4 attractants (Ethanol, α -pinene, quercivorol, α -copaene), and the collector with insecticide net
3. Collect the trapped beetles every 3 weeks until November
4. Change repellents and attractants, and insecticide every 6 weeks

Site proposal:

2 site in Italy

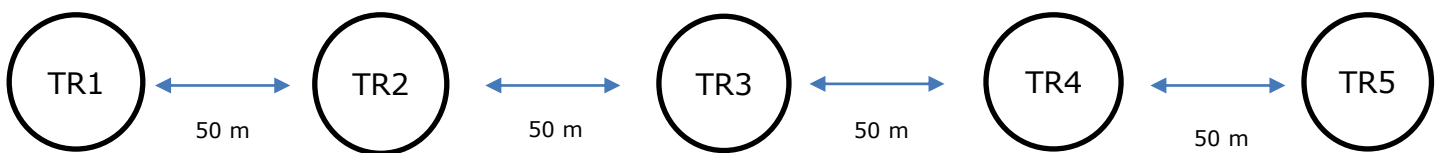


Fig.1 Summary scheme of linear transect

The 2022 trapping protocol will be similar as the one for 2021, and based on black multifunnel traps baited with quercivorol (1ml) + α -copaene (2 ml)+ Ethanol + (-) α -pinene. The exact design is shown in Figures 2.

Although expected by the suppliers to last 60 days, pragmatic observations led to consider that the efficacy of these doses disappear long before because of the Mediterranean climate during summer. Thus, all of these doses are to be replaced after 6 weeks.

The position of the doses must be as follows: the pack of ethanol is placed tied to the middle of the trap (Figure 3) and the bubbles of quercivorol and α -copaene as well the pack of a-pinene are tied to the 2nd funnel from the bottom.

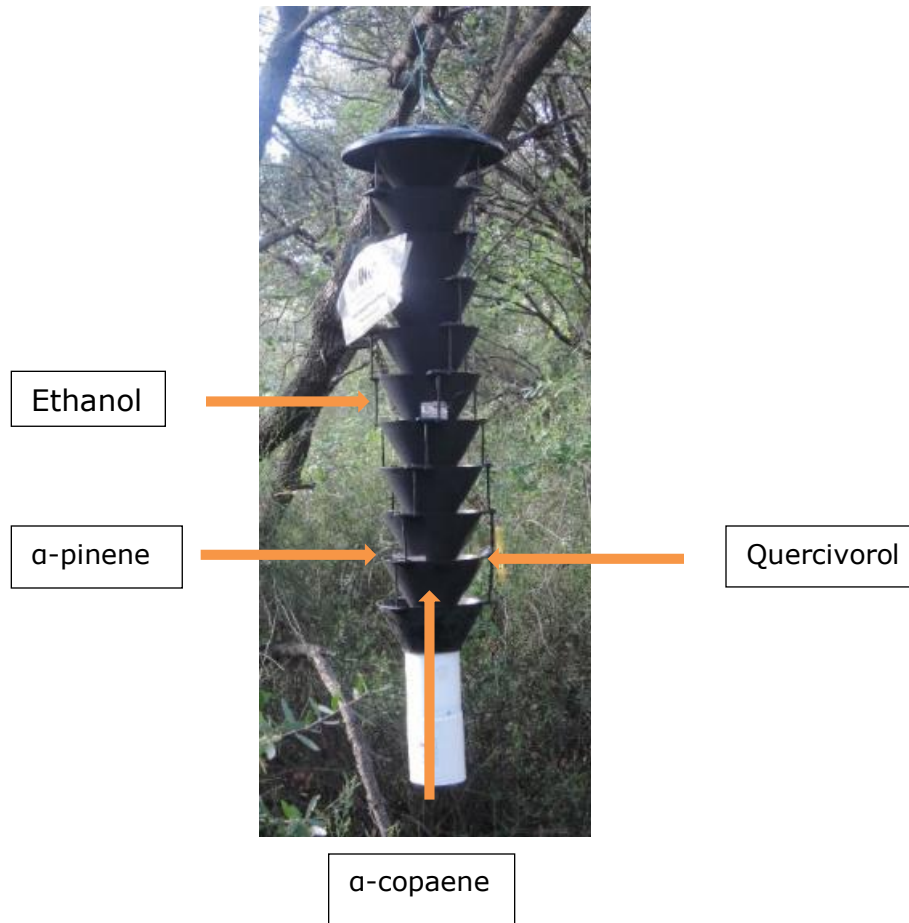


Fig.2 Multifunnel trap armed

The two sites identified are: one along the path in Quarto Freddo locality, where the transect n.8 was located in the 2021 campaign, and one along the forest boundaries, where the transect n.6 was positioned in the 2021 campaign.



Fig. 3 Sites of linear transect in the National Park

The choice of these two places was made on the basis of the analysis of the insects captured in 2021 monitoring campaign, which shows that the individuals of the species in question (*Xylosandrus compactus* and *X. crassiusculus*) have significantly decreased over the years of the project, but not disappeared, and the areas where the highest number of insects have been captured are the northern border of the forest and in San Felice Circeo, in the locality of "Peretto".

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Furthermore, compared to the "push and pull", the monitoring of the Transept is less expensive in terms of time and personnel employed.

3. X-traps

The X-Traps, designed and developed within the SAMFIX project by Terrasystem, are IoT modules that can be integrated into traditional traps such as the Crosstraps produced by Econex but also adaptable to other types of traps. They allow to count and recognize daily Xylosandrus captures through the acquisition and recognition of high resolution macro photographic images.

Further images are acquired to evaluate the vegetation of the tree where they are installed and the filling of the collection collector of the trap itself as diagnostic data. The X-Traps are also equipped with a GPS / Glonass satellite receiver, a thermo-hygrometer that acquires hourly temperature and humidity data and a 3G modem for daily data transmission to the Terrasystem cloud server, through which it is also possible to configure them remotely. Powered by solar energy, the X-Traps are suitable for use in all types of environments. After the successful completion of the field test campaign at the Circeo National Park (Italy), X-Traps will be installed in the core sites of the SAMFIX project, for the 2022 trapping campaign, of which 3 at Circeo.



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Fig. 4-5 one of the three X- Trap installed in the Circeo National Park during the preliminary test and a picture of the interior of a collector.

4. Other monitoring traps and other surveillance activities

5 traps will be installed in order to support the activities related to the C1 remote sensing action with data on the ground. The traps will be installed in the areas of the Park not covered by the sampling methods described above.

The data taken through the traps will be accompanied by ground surveys on the state of Xylosandrus infestation by monitoring the state of the vegetation on points established during the last sampling year.

The monitoring activity in the Circeo National Park will continue with active surveillance on field by the park staff. The SAMFIX agent app will be used to collect data on the field.

5. Conclusions

According to the data collected in the 2021 monitoring campaign, the protocols showed a low level of infestation of *Xylosandrus* spp., even if the beetle is present in the various areas of the Circeo National Park, therefore there is still a need to monitor the territory.

These data will help us to define a golden standard in managing ambrosia beetle invasion in natural environments and have an increasingly accurate picture of the level of infestation in the Circeo National Park.