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Vespa velutina in Italy: an update on its distribution and management through the life STOPVESPA project

Lioy S., Laurino D., Romano A., Croce L., Capello M., Porporato M.

Department of Agricultural, Forest and Food Sciences, University of Turin, Largo Paolo Braccini 2, 10095, Grugliasco (Turin), Italy

The yellow-legged hornet *Vespa velutina* Lepeletier 1836 is an invasive alien species that is colonizing Italy since 2012. First colonies were discovered in 2013 in the north-west part of the country, in the Liguria and Piedmont regions. Afterwards, *V. velutina* rapidly increased its range and density, mainly in Liguria, where the species was able to colonize new areas at a mean spread rate of 18.3 ± 3.3 km/year.

The European project LIFE STOPVESPA is acting to contain the spread of *V. velutina*, in particular in the north-west of Italy where it is creating a coordinated system to manage the populations, so as to develop an Early Warning and Rapid Response System for the species. The strategy adopted since now involved different actors, such as local authorities, beekeepers and their Associations, Civil Defence bodies and STOPVESPA staff, in the monitoring and control activities. This strategy allowed to detect 480 colonies of *V. velutina* in Liguria in 2016: 84% of these colonies were inactivated by the project, 8% by other people and 8% were discovered in winter, when gynes had already abandoned the colonies. The nests were located mainly on trees (61%), secondly on buildings (33%) and lastly in other unusual positions (6%). Interestingly, the 2016 nests were located at a mean altitude of 160 ± 14 m a.s.l., with extreme values ranging from the sea level to 856 m a.s.l.

The data collected during the 2016 season allowed to update the distribution of *V. velutina* in Italy. The species increased its range in Liguria with a lower rate than the one recorded for previous years, and the colonized area passed from 930 km^2 in 2015 to 1,086 km^2 in 2016. Despite this slow expansion, densities and extent of the core-areas increased in the area already colonized by

V. velutina, passing from a mean density of 5.0 ± 2.9 nests/km^2 in core areas with a total surface of 54 km^2 in 2015 to 6.6 ± 3.1 nests/km^2 in core areas of 125 km^2 in 2016. Moreover, the population in the south of Piedmont is confirmed by the discovery of adults in predation in 2016 and the detection of a nest in 2017. In addition, a new Italian population has been reported between Veneto and Lombardy regions, where a nest and adults were discovered at a distance of about 280 km from the previous Italian records.
Finally, the predictive models of expansion developed by the project in 2015 to evaluate the spread of the species in 2016 were confirmed: 98.3% of the nests discovered outside the 2015 range were located inside the predicted areas of expansion for the scenarios that considered the altitudinal limits of 900 and 1200 m a.s.l.
The strategy already developed by STOPVESPA as soon as implemented with the radar prototype under development should form the basis of an Early Warning and Rapid Response System for *V. velutina*.

Design and testing of an harmonic radar for the tracking of the yellow-legged Asian hornet

Maggiora M.[1], Milanesio D.[1], Saccani M.[1], Laurino D.[2], Porporato M.[2]

[1]Politecnico of Turin, Dipartimento di Elettronica e Telecomunicazioni (DET), Turin, Italy
[2]Department of Agricultural, Forest and Food Sciences, University of Turin, Largo Paolo Braccini 2, 10095, Grugliasco (Turin), Italy

We developed and tested an harmonic radar capable of tracking the flying trajectory of the yellow-legged Asian hornets, once equipped with a small transponder, in their natural environment. This radar is, to the best of our knowledge, one of the most effective ways to follow the hornets to their nests.