

Impact of *Vespa velutina* on honey bees and other pollinators

Laurino D., Carisio L., Lioy S., Manino A., Bianchi E., Romano A., Capello M., Porporato M.

Department of Agricultural, Forest and Food Sciences, University of Turin

Largo Paolo Braccini 2, 10095, Grugliasco (Turin), Italy



The spread of invasive alien species and the decline of pollinators are two main issues that must be handled for the conservation of nature and biodiversity. Pollinators are a group of animals - mainly insects like honey bees, wild bees, hover flies, butterflies, moths and beetles - of primary importance, which contribute to pollinate crops and wild plants. They are facing a serious decline in occurrence and diversity in the last decades. The Asian yellow-legged hornet (*Vespa velutina*) is an invasive alien species that represents a serious threat to European pollinators. It is known to be a fierce predator of honey bees, but it can also hunt many wild pollinators and overthrow native wasps. Beside to the control activities developed by the LIFE STOPVESPA project against this invasive hornet, the impact of *V. velutina* on pollinators has been evaluated throughout the analysis of the status and trends of honey bee colonies, wild pollinators and wasps communities in Liguria region, Italy.



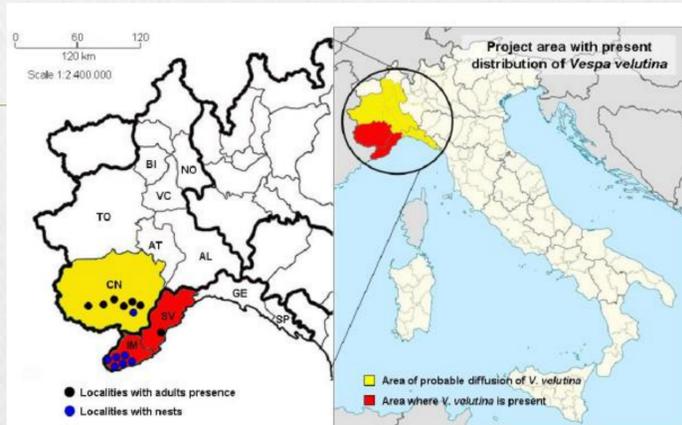
The intense predatory activity of *V. velutina* towards honey bees can generate a decrease in the strength of the colonies and the subsequent collapse of the family. This primarily generates economic damage to the beekeeping sector, as well as a decrease in the number of bees in the environment resulting in a decline in the ecosystem pollination service. Although *V. velutina* has been present in Europe since 2004, the impact on beekeeping has been quantified on a few occasions. For this reason, the LIFE STOPVESPA project installed in Liguria, between 2017 and 2018, 6 experimental apiaries that allowed to quantify the impact of *V. velutina* on honey bees.

V. velutina is an active predator of other insects; during the larvae rearing phase, the hornets hunt insects to obtain the proteins necessary to feed the brood. This can generate biodiversity losses in the areas colonized by the Asian yellow-legged hornet. To assess the impact of *V. velutina* on native insect communities, the project staff carried out different monitoring activities of the native entomofauna.

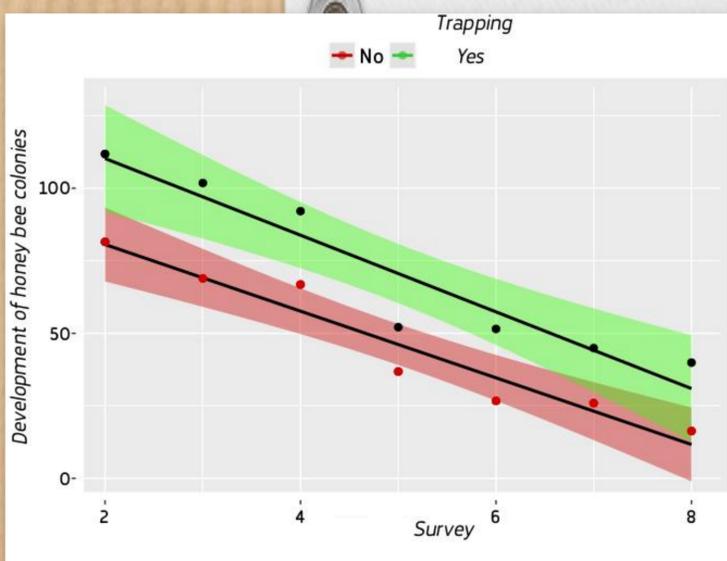


To reduce the losses of honey bee colonies, many beekeepers adopt the method of trapping *V. velutina* queens in the spring period, when the founder queens begin the construction of primary nests. To assess its effectiveness, the LIFE STOPVESPA team verified this methodology in 3 of the experimental apiaries of Liguria, placing 40 bottle traps for hornets in each study area. The analysis of the data on the development of honey bee colonies highlight that bee families developed better in the apiaries where a spring trapping was carried out compared to the areas where the capture of *V. velutina* queens was not performed.

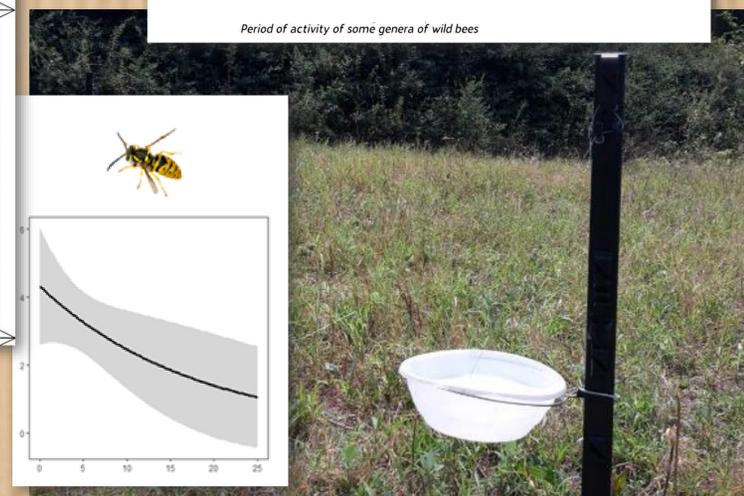
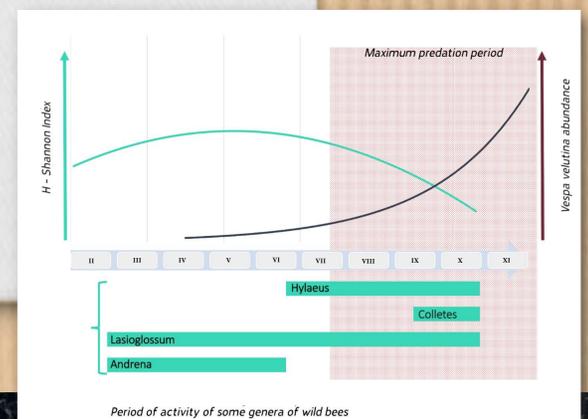
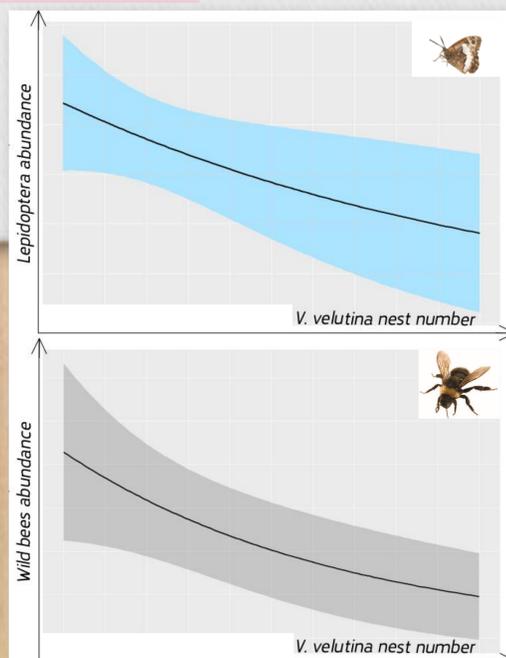
In the apiaries where no countermeasures were undertaken to limit the impacts of *V. velutina*, an average loss of 18% of honey bee was quantified.



Different study areas were selected at various level of density of the Asian yellow-legged hornet. Pollinating insects and wasp communities were periodically sampled using two types of traps (baited bottle trap and pan trap) in different seasonal periods. 25 species of wild bees not previously reported in Liguria region and one new species for Italy (*Andrena asperrima*) were found. We identified which wild bee genera may be more endangered because of the overlap between their flight period and high *V. velutina* predation. Asian yellow-legged hornet nest density clearly affects insect communities, generating significant drop in European hornet, wild bees and diurnal butterflies abundances.



The size of honey bee colonies decreases naturally from summer (session 2) to autumn (session 8), however the bee colonies were larger in the apiaries where *V. velutina* queens spring trapping was performed (green) rather than in the apiaries where the spring trapping activity (red) was not performed.



LIFE STOPVESPA is a project realized with the financial contribution of the European Union