Beer or not beer?
Comparison of the attractiveness and selectivity between two types of traps and baits as a control tool for the invasive *Vespa velutina*

Michela Capello[1], Andrea Romano[1], Simone Lioy[1], Aulo Manino[1], Marco Porporato[1]

[1] Department of Agriculture, Forest and Food Sciences, University of Turin (Italy)

Introduction

The Asian yellow-legged hornet, *Vespa velutina*, is an invasive predator of honeybees accidentally introduced in Southwest France in 2004, an event followed by impressive colonisations of several areas within Western Europe.

Material and methods

Study Area
The study was carried out in two different *V. velutina* high-density areas located in Liguria (Italy).
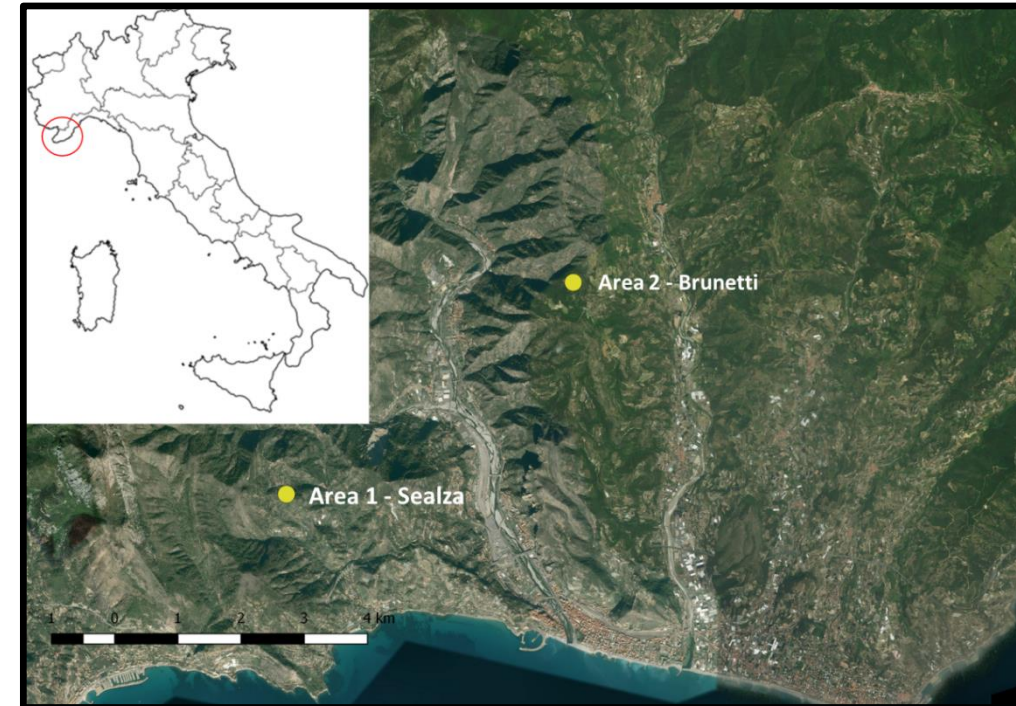
Area 1: Sealza, Ventimiglia (N43,808998 E7,551112)
Area 2: Brunetti, Camporosso (N43,8392490 E7,606592)

Tested traps
- 1.5 l polyethylene (PET) bottle with yellow cap of the Tap trap® model
- VespaCatch by Veto-Pharma© model

Tested baits
- Light beer with 4.7% alcohol content
- VespaCatch attractant by Veto-Pharma©

Aims of the study

The aim of this study **is to compare the effectiveness of two proprietary traps** (Tap Trap© and VespaCatch by Veto-pharma©) **and two types of baits** (beer and VespaCatch attractant by Veto-pharma©), focusing on two factors: *i*) the **attractiveness** towards *V. velutina*, *ii*) the **selectiveness** towards no targets insects.

The traps and baits were combined as followed:
TB: Tap trap®+ Beer
VB: VespaCatch trap + Beer
TV: Tap trap®+ VespaCatch attractant
VV: VespaCatch trap + VespaCatch attractant

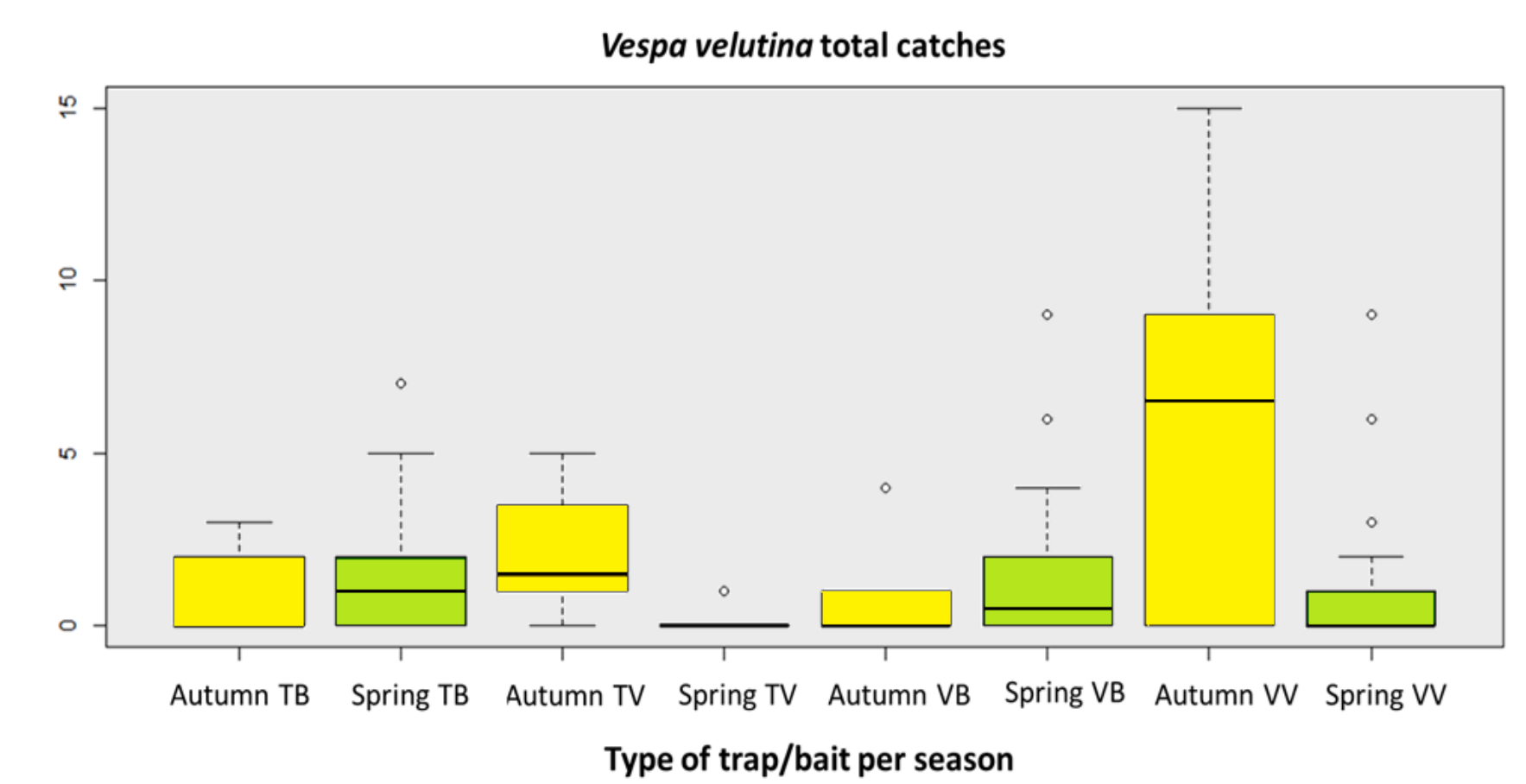| TB	VB	TV	VV
TB	VB	TV	VV
TB	VB	TV	VV

For each area, 12 traps were placed as shown in the pattern. To avoid any interference due to the position, each bait trap was moved at every sampling.

Results

Attractiveness

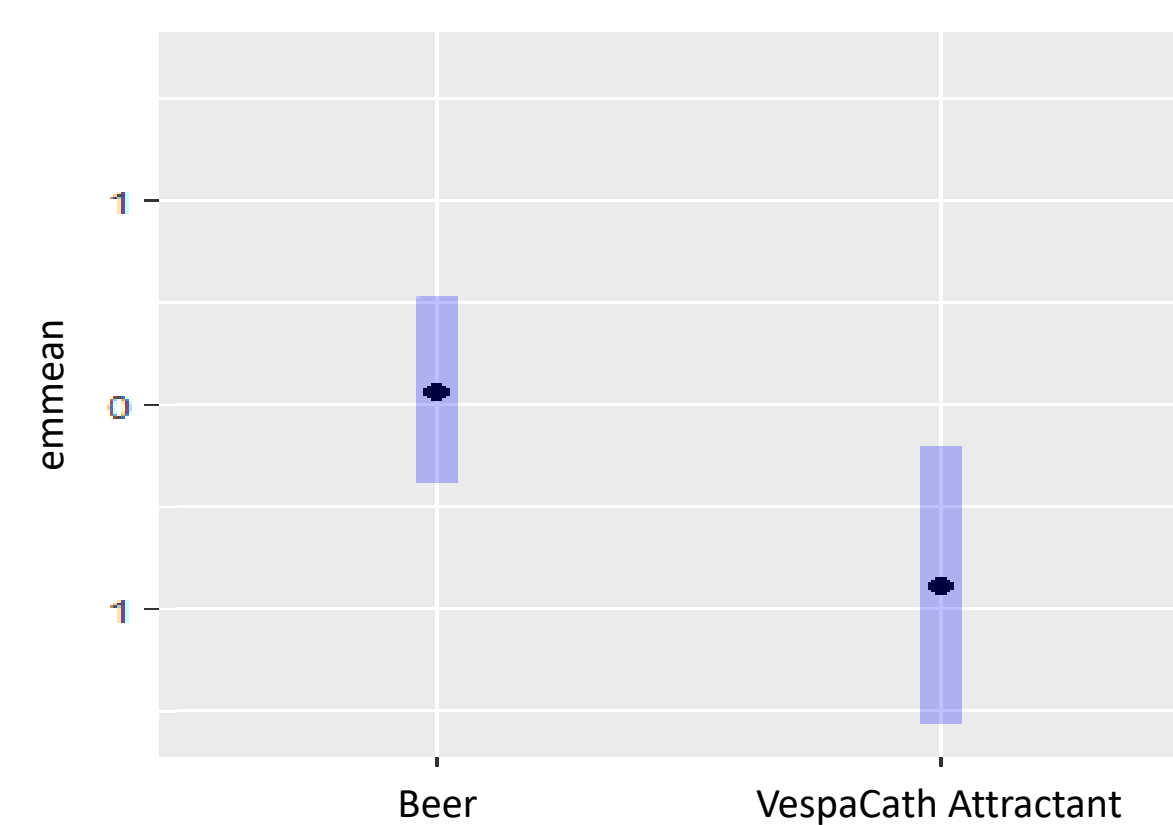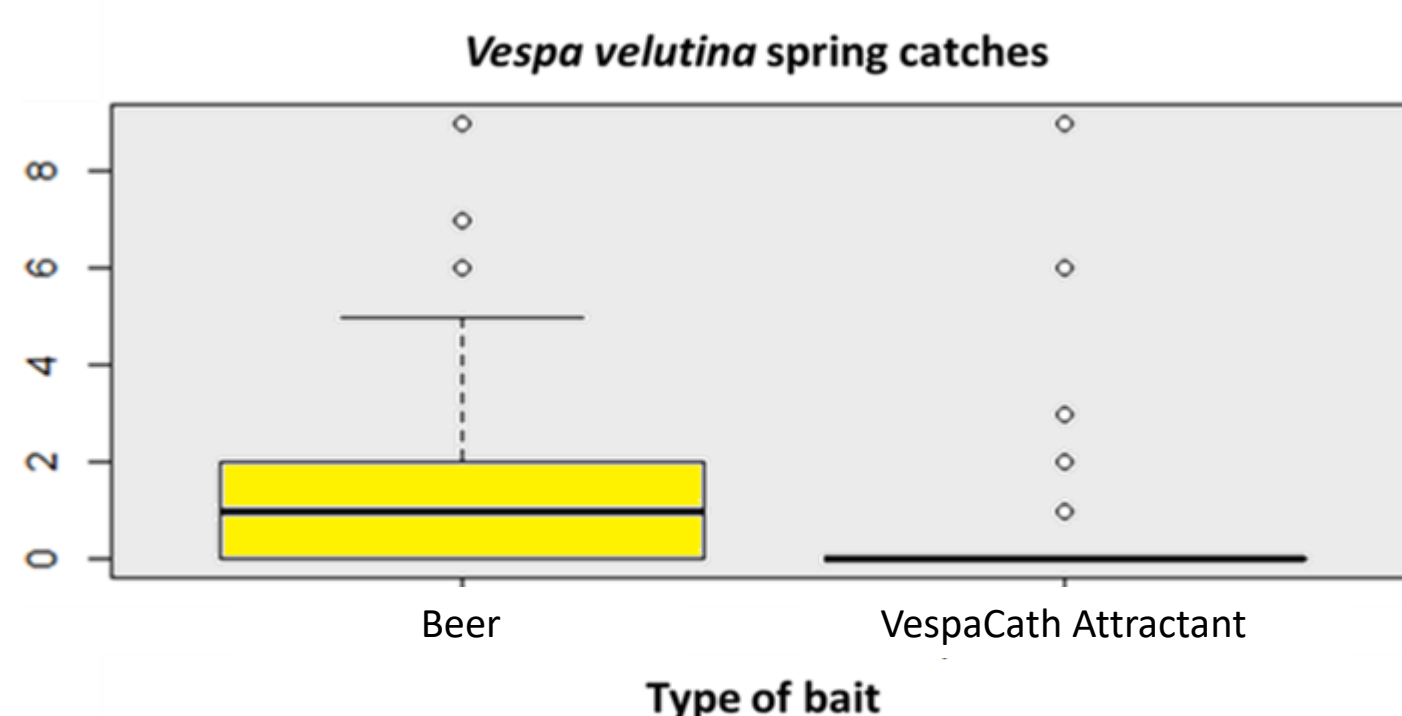The season and the type of bait showed significant effects on *V. velutina* capture rates.

Vespa velutina total catches

Spring

During spring, beer was significantly more attractive than VespaCatch Attractant.
General Linear Mixed Model:
$\text{EMMs}_{\text{Beer}} = 0.06$, **SE** = 0.23
$\text{EMMs}_{\text{VespaCatch}} = -0.89$, **SE** = 0.35

Vespa velutina spring catches

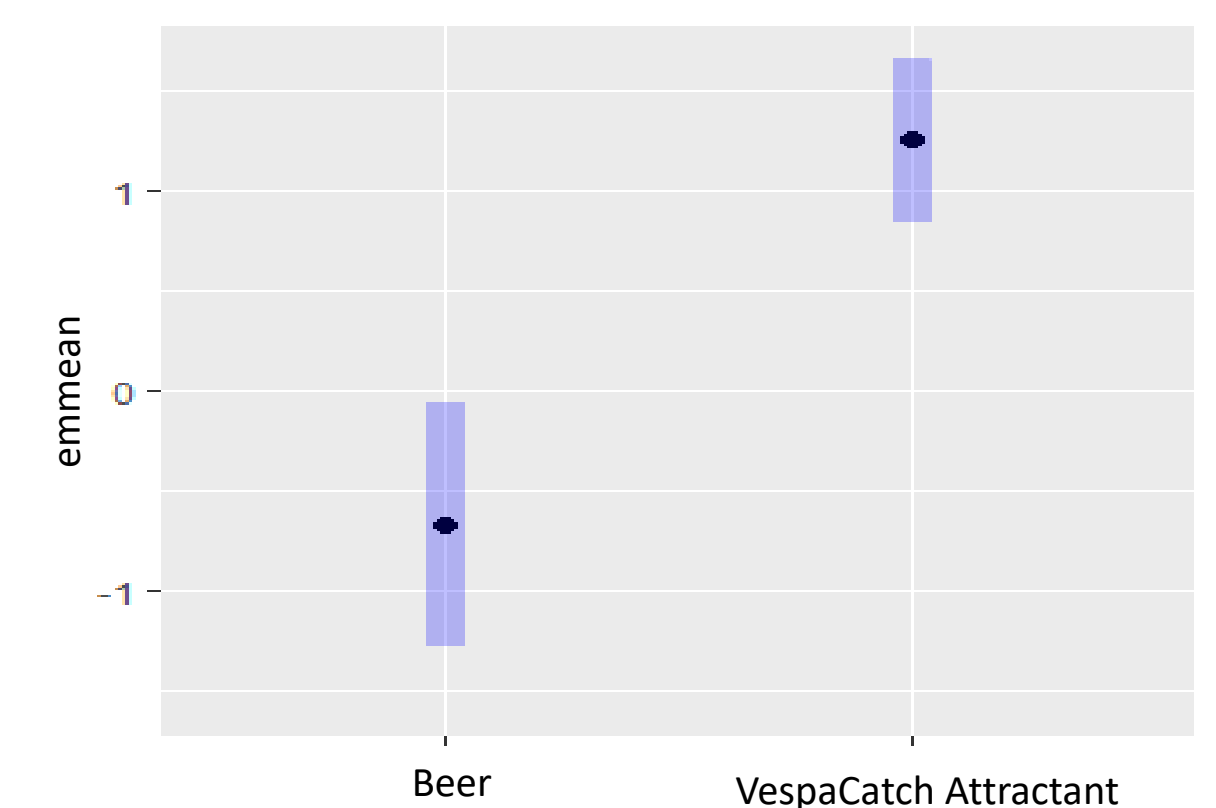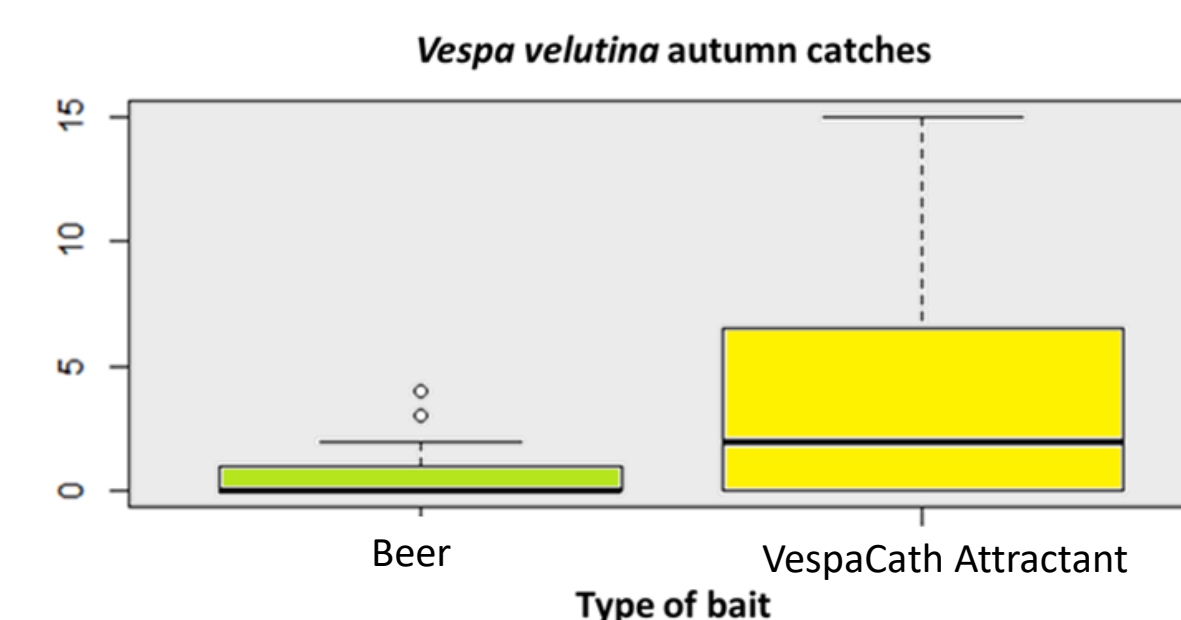The two types of traps showed no significant differences on *V. velutina* capture rates.

Autumn

In autumn VespaCatch Attractant was more effective than beer.
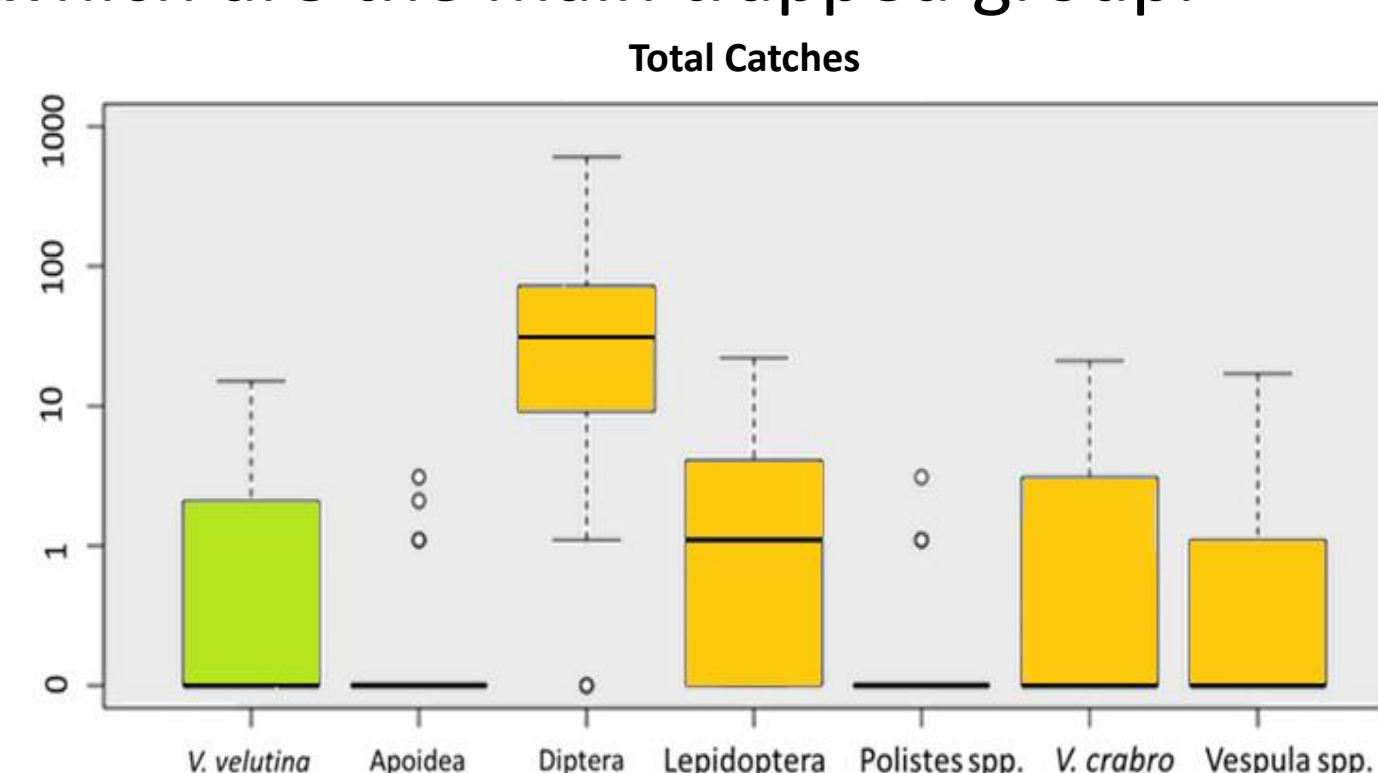General Linear Mixed Model:
$\text{EMMs}_{\text{Beer}} = -0.67$, **SE** = 0.31
$\text{EMMs}_{\text{VespaCatch}} = 1.25$, **SE** = 0.21

Vespa velutina autumn catches

VespaCatch Attractant effectiveness is maximized with its proprietary trap
GLMM result of the interaction effect of VespaCatch trap and bait.
$\text{EMMs}_{\text{VV}} = 1.17$, **SE** = 0.26 $\text{EMMs}_{\text{TV}} = -0.82$, **SE** = 0,4
$\text{EMMs}_{\text{VB}} = -0.52$, **SE** = 0,35 $\text{EMMs}_{\text{TB}} = -0.09$, **SE** = 0,32

Vespa velutina autumn catches

Selectiveness

The four combination of traps are capturing also different species and taxa, such as *V. crabro*, Vespula spp., Polistes spp., Lepidoptera, some Apoidea and Diptera, which are the main trapped group.

Total Catches
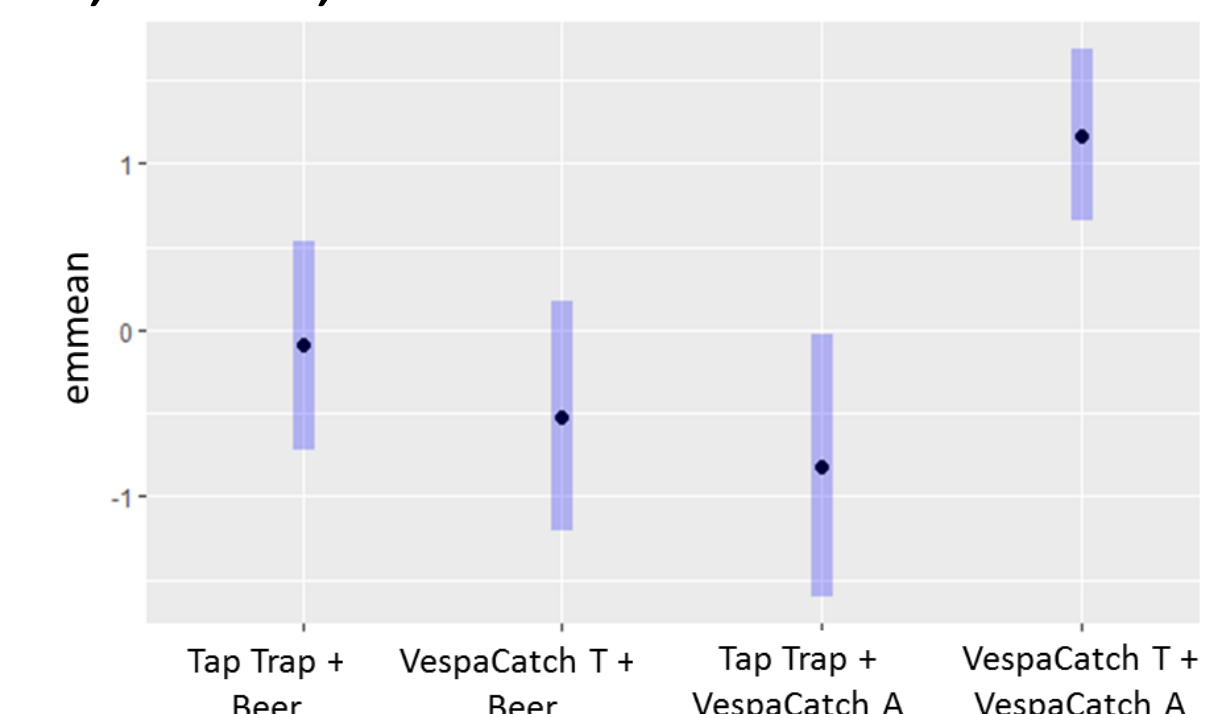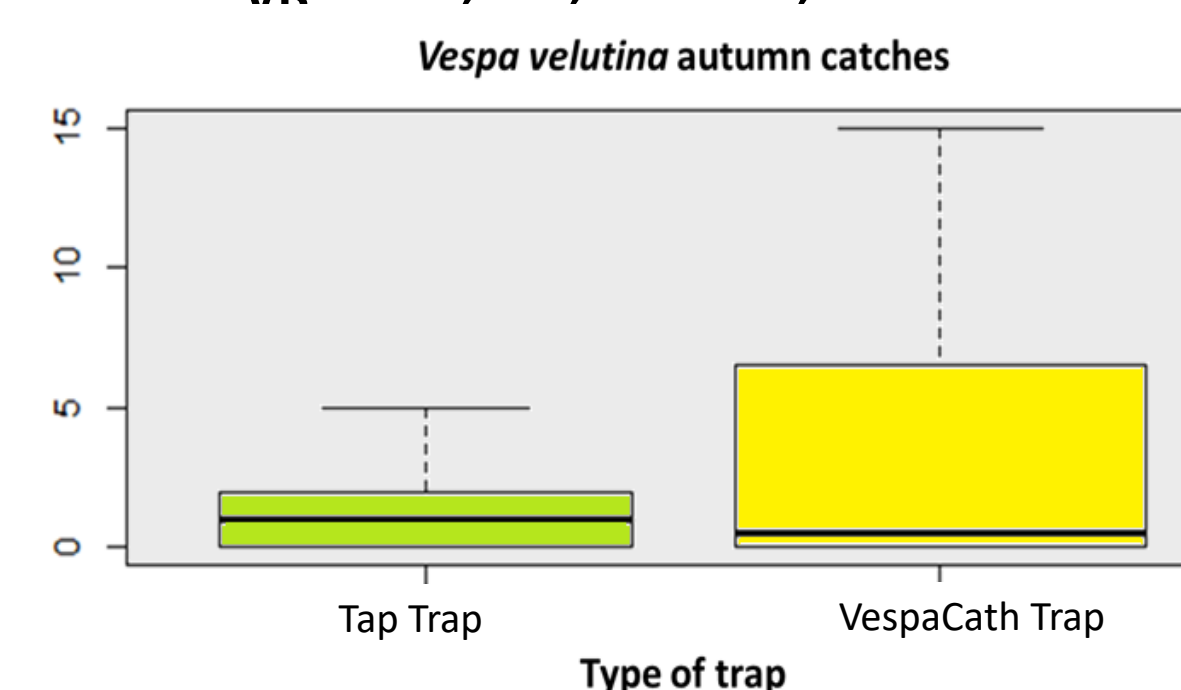
Bait selectiveness
(no-target insect / *V. velutina*)

Taxa	Beer	VespaCatch A	p-value
Apoidea	0,2360	0,0403	0,0015
Diptera	47,4494	46,5323	1,0000
Lepidoptera	2,5618	1,2419	0,0002
Polistes spp.	0,0787	0,1048	1,0000
V. crabro	1,2247	1,2258	1,0000
Vespula spp.	0,5056	1,0403	0,0075

P-value according to Fischer's exact Test with Bonferroni correction.

Conclusions

To maximize the *V. velutina* trapping effect, it would be appropriate to use beer as a bait in the spring period. On the contrary, in autumn, VespaCatch attractant and trap is the best combination for capturing the highest number of Asian hornets.
Future analyses on no-target species abundances in the environment correlated to the number of trapped insect are necessary to understand the effect of trapping on the biodiversity.