

OR046*Sub-lethal effects of a neonicotinoid pesticide on honeybee flight performances***Simone Tosi**, James C. Nieh

Pesticide residues found in pollen and nectar are usually not lethal for pollinators, but can have complex sub-lethal effects that decrease the fitness and health of bee pollinators. Multiple studies have demonstrated sub-lethal behavioral effects of pesticides on honeybee foraging and orientation, but no studies have yet examined the detailed effects of pesticides on the flight ability of honeybees. Our goal was thus to investigate how acute and chronic sub-lethal field-realistic doses of thiamethoxam (a neonicotinoid pesticide) influence honeybee flight performances. We conducted two experiments. In the acute exposure experiment, honeybees received a single sub-lethal dose of pesticide (1.34 ng/bee) while in the chronic exposure experiment, bees were fed with 1.8 M sucrose solution containing either 0 ppb (control), 33 ppb, or 45 ppb of thiamethoxam for the 2 days before the test flight. Honeybee flight performances were evaluated using a flight mill that measured duration, distance, average velocity and maximum velocity. Each bee performed two flights. We show that an acute exposure to thiamethoxam causes temporary excitation, a significant increase of the duration and distance flown by the bees. In contrast, chronic exposure significantly decreases of duration, distance and velocity (both average and maximum) of the flights. These results provide the first demonstration that a sub-lethal pesticide dose can alter bee flight performances. The effect depends upon the duration of exposure to thiamethoxam.