

**OR044***Chronic impairment of bumblebee foraging induced by sublethal pesticide exposure***Richard Gill**, Nigel Raine

Continued human population growth means food security is an increasingly pressing issue. Pesticides are considered essential to maintain high crop yields, and systemic pesticide use has increased significantly in the last two decades. Systemic pesticides, e.g. neonicotinoids, provide pest protection throughout the plant for an extended period of time. However, residues are also found in the nectar and pollen of flowering crops: an unintended route of pesticide exposure for beneficial pollinating insects. Bees contribute a substantial proportion of insect pollination so they are an insect group that could be at particular risk. As the most widely used class of systemic pesticide, neonicotinoids have been implicated as a causal factor in reported bee declines. Yet there is much debate over whether neonicotinoid residues in the environment are detrimental to bee health with empirical evidence providing mixed support. Most studies of sublethal impacts of neonicotinoids have focused on the effects of acute exposure on bee behaviour. However, bees in the field are likely to be exposed to pesticide residues over extended periods of time, and there is a paucity of data showing how bees respond to persistent exposure. We investigated the effect(s) of field-level neonicotinoid exposure on the bumblebee *Bombus terrestris* (40 colonies), including examining natural foraging behaviour using radio frequency identification (RFID) tagging (259 foragers performing 8751 foraging bouts), over four weeks. We provide detailed data on the day-to-day natural foraging patterns to assess the temporal dynamics of how foraging behaviour was affected. We show that prolonged pesticide exposure has both acute and chronic impacts on fundamental aspects of forager behaviour and performance. These findings will improve our understanding of how persistent pesticide exposure might affect pollination efficiency, identifies whether subtle pesticide induced behavioural impairments accumulate over time, and has implications for how we should conduct risk assessment protocols.