Results

First Stage – Timing of potential exposure

The first stage examines whether an apiary with a large share of neonic-treated crops within the foraging radius would have higher probability to being contaminated by neonics during certain times of the year. In other words, we explore during which time of the year bees’ exposure to neonicotinoid pesticides through nearby crops would contaminate the apiary. We aggregated the shares of all 9 commonly treated crops and interacted these numbers with planting and bloom time. Planting time and bloom time are both dummy variables indicating whether any treated crops within the 2-mile radius are being planted or in bloom on the date of collection.

All the specifications below show strong evidence that the share of treated crops nearby during planting time positively contributes to the likelihood of apiaries to be contaminated by neonics. When we controlled for year fixed effect and region fixed effect, the evidence becomes stronger with higher R-squared. Moreover, when we controlled for bloom time, the models appear to be even better fits with significant results. We also find that an increase in shares of treated crop nearby during bloom time would decrease the likelihood of apiaries to be detected with neonics when foraging and weather variables are not controlled. NDVI, an indicator of vegetation is negatively correlated with the likelihood at a statistically insignificant level. Precipitation appears to be positively correlated with the probability of contamination, but the results are not significant either.



Second Stage – Disease Levels

In the second stage, we examine whether being contaminated by neonicotinoid pesticide would increase disease loads in apiaries. We ran two sets of specifications for the commonly identified diseases: Nosema and Varroa. For Nosema, we first ran a simple regression with binary variable indicating the contamination status of apiaries and month quadratic trend. Then, we included year and region fixed effects and other control variables. According to the results, when foraging and weather are controlled for, an apiary that is contaminated by neonics tend to have about 0.41 million spores per bee higher in Nosema loads than one that is not contaminated. Since Nosema is one of the indicators for bee health, this result suggests that an apiary contaminated by neonics tend to have higher morbidity rate.

We ran the same regressions with mites loads as the outcome variable. When year and region fixed effects are controlled for, results suggest an insignificantly negative correlation between neonic contamination and mites loads.



