



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

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<b>Project Title</b> <b>Pollination! Its What's for Dinner! Investigating the Effects of Neonicotinoids on Bee Pollinators</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this experiment is to determine if honey bee pollinators that have been exposed to neonicotinoids can pollinate crops and function efficiently compared to hives that have not had exposure to neonicotinoids. I tested for an increase or decrease in crop production. <b>Methods/Materials</b> I exposed 72 hives to neonicotinoids(control groups) and 72 hives were placed in pesticide free areas. 36 hives were exposed to Clothianidin(neonicotinoid) in alfalfa fields, 36 hives were exposed to Thiamethoxam(neonicotinoid) in a cornfield, 36 hives were in a pesticide free alfalfa field, 36 hives were in a pesticide free corn field. I exposed bee pollinators to different levels of Imidacloprid(neonicotinoid) through pollen cakes and liquid sugar. I tested bee samples, corn syrup, honey, and pollen patties for neonicotinoid residue. I checked crop production from pollination in each group. <b>Results</b> 72 hives exposed to neonicotinoids had major losses 50%-70% in colony size and deformities in the bees noticeable in the baby larvae dying. Neonicotinoids leave trace amounts of residue in honey. I found mite populations to infest the hive, which causes CCD in worker bees and in capped brood cells. There was an insufficient work force to maintain the brood that was present and a noticeable decline in honey and pollination production from neonicotinoid fields. Neonicotinoids disrupt the bee's central nervous system, learning and GPS navigation, making them vulnerable to parasites and viruses. Testing for neonicotinoid residue in corn syrup showed that it survived the sugar processing. Pollination was reduced 16-20% due to navigation and learning disorders. Up to 17 different pesticides were found in a single pollen sample, levels of 11-22 ppb. Test colonies fed neonicotinoids had 1,000 times more Deformed Wing Virus and is 5,000 times more toxic than DDT to bees. <b>Conclusions/Discussion</b> I learned exposure to neonicotinoids are killing our bee populations and leading to CCD disorder, which causes a reduction in pollination. Pollinator bees have complex neurological systems, a biological GPS that provides them with a mental map of their hive, pollination areas and location which has been destroyed by neonicotinoids. It makes the bee more susceptible and vulnerable to parasites and viruses, including the intestinal parasite nosema. Pollination and production were up in pesticide free areas.	
<b>Summary Statement</b> My project shows how bees exposed to sublethal levels of neonicotinoids are killing my bees, leading to Colony Collapse Disorder, and less pollination.	
<b>Help Received</b> My mom worked with me, as she is a beekeeper, the Bee Diagnostic team helped with my testing along with the USDA.	