



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Joseph A. Huitt</b>	<b>Project Number</b> <b>S2209</b>
<b>Project Title</b> <b>Don't Mess with my Bee's Nervous System! Investigating the Effects of Neonicotinoids on Bee Colonies</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to see if honeybees are being exposed to neonicotinoids, and if I can completely eliminate or control the exposure of neonicotinoids to my colonies, keep my hives strong for pollination, over wintering and not contaminating honey.</p> <p><b>Methods/Materials</b> Tested for neonicotinoid residue in bee samples, corn syrup and honey. 36 hives were exposed to Clothianidin (neonicotinoid) in alfalfa field, 36 hives in cornfield exposed to Thiamethoxam (neonicotinoid), 36 hives in pesticide free corn seed field, 36 hives in pesticide free alfalfa field. Clothianidin and Thiamethoxam are my control groups because bees are commonly exposed to these chemicals to compare effects on the colonies.</p> <p><b>Results</b> 72 hives exposed to neonicotinoids had major losses 50%-60% in colony size and deformities in the bees, noticeable in 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 production from neonicotinoid fields. Neonicotinoids disrupt the bee's central nervous system, learning and navigation, making them vulnerable to parasites and viruses. After testing High-fructose corn syrup for neonicotinoid residue, it was found and survived the sugar processing.</p> <p><b>Conclusions/Discussion</b> Exposure to neonicotinoids is killing bees, queens, and leading to CCD by making hives vulnerable to mites, parasites and viruses. It's found in nectar and pollen that worker bees gather, take back to nurse bees to make beebread then fed to new bee larvae, which showed reduced survival, and pupation, deforms new worker bees, disorients its nervous system, or dies in cells before hatching out. Honeybees exposed to neonicotinoids experienced problems with flight, navigation, slower learning new tasks, impacts foraging abilities and hive productivity. Neonicotinoid dust is highly toxic to bee's. High fructose corn syrup tested positive for neonicotinoids. The neonicotinoid defects were cut 100% in most hives and CCD was cut extremely (5%) winter loss. Spray free areas were full of healthy pollen, which led to healthy bees and more honey production. I observed dead bees where fields were treated with neonicotinoids. Corn and sugar syrups contain neonicotinoid residue causing great losses to bee colonies.</p>	
<b>Summary Statement</b> My project shows how bees exposed to sub lethal levels of neonicotinoids are killing my bees and leading to colony calapse disorder.	
<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.	