



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Katia A. Mafra Spencer</b>	<b>Project Number</b> <b>S2299</b>
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<b>Project Title</b> <b>Cockroach Push and Pull</b>
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<p><b>Objectives/Goals</b> The objective of this project was to determine if plant extracts can be used to modify the behavior of German cockroaches, <i>Blatella germanica</i>.</p> <p><b>Methods/Materials</b> A two-choice test was performed to determine the effect of a treatment as a behavior modifier. A Petri dish with two dollops of 15mg food, received a dollop of the Treatment formulation (SPLAT with either Guava, Clove, Savory, Peppermint or Control) on one side and the Control on the other. The five treatments were replicated six times. Four roaches were released in the center of each Petri dish. Twelve hours later the position and the physiological state of each roach was determined.</p> <p><b>Results</b> The data indicate that: 1. The bioassay showed no bias to roach position due to external conditions. 2. 92% of the cockroaches congregated on the opposite side of the Savory dollop, suggesting a strong repellent effect. 3. 71% of the cockroaches chose the Guava extract; 79% rested on top of the dollops, showing a very strong attractant and/or arrestant of German cockroaches.</p> <p><b>Conclusions/Discussion</b> My original hypothesis was that Guava would be the strongest repellent of <i>B. germanica</i> was proven wrong. To our surprise Savory was the most repellent treatment, whereas Guava proved to have a strong attractant and/or arrestant effect on German cockroaches, contrary to all previous literature.</p> <p>Most conventional insecticides used for roach control have deleterious effects on non-target species, including humans. The results from this Science Fair project could help in the design of more benign, environmentally safe, German cockroach control through a #push and pull# management solution. Our data indicate that German cockroaches not only were attracted, but also were aggregated and arrested on top of the guava extract dollops (pull), whereas Savory had a strong repellent effect (push). Savory can be used to push the roaches out of a certain area without the need of conventional insecticide. A combined pull strategy, with the guava extract, can be used to lure the cockroaches to less sensitive areas where the application of insecticide might be more acceptable, or where the guava extract is combined with small doses of a selective contact insecticide. This push and pull strategy could result in less use of insecticide while still obtaining similar, or perhaps even better, suppression of cockroach populations than currently</p>	<p><b>Abstract</b></p>
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<p><b>Summary Statement</b> In a choice bioassay, German cockroaches are strongly attracted to Guava extract and strongly repelled by Savory extract.</p>
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<p><b>Help Received</b> Katia Mafra Spencer used lab equipment at the Department of Chemistry and Department of Biology at ISCA Technologies, Inc. Received assistance from Lisiane Zeni with scale usage, father Agenor Mafra-Neto assisted in experimental design and sister Margot Mafra Spencer helped with microscope</p>
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