No Ifs, Ands, or Butts: The Effect of Cigarette Butt Litter on Root Length of Germinating Centaurea cyanus

Le, Uyen-Vy (School: Oak Grove High School)

Cigarettes are widely known to be harmful to humans and animals. However, with further research into plant interactions, cigarettes could possibly be harnessed for beneficial purposes, such as weed management. Due to the presence of plant-based and inorganic chemicals in cigarette butts, the leached chemicals were hypothesized to have negative effects on the root length of germinating weeds. As a historic insecticide, tobacco may also have herbicidal properties that can affect other plants through allelopathic relationships. Growing chambers were made by layering paper inside CD cases with a water-delivering cup stand. For Trial 1, a control and three experimental groups were organized with increasing gradations of cigarette butts (from one source and brand) inside each experimental growing case's water supply. In Trial 2, cigarettes were separated into their filter, paper, and tobacco/additives components and added separately into the experimental water. Digital calipers were used to measure root length. Using ANOVA analysis, the difference between the control and the experimental data was significant at $p < 0.01$ at all days except the first two. One, two, and three cigarettes decreased growth by 39.75%, 68.10%, and 83.99%, respectively. This positive correlation suggests that cigarettes do have unfavorable effects on weeds. Secondary trials showed that the filter and tobacco/additives decreased growth by 8.02% and 55.5%, whereas the paper increased growth by 2.26%. These effects could further be analyzed by additional experimentation with larger sample sizes and identification of a cigarette's chemicals through gas chromatography–mass spectrometry.

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