Examination of Oxidative Stress in Evergreen Trees

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This experiment examined the level of Vitamin C in evergreen trees exposed to petroleum fumes. The scientific literature state petroleum fumes and by-products have been associated with oxidative stress. Further, Vitamin C is required in plants to protect against oxidative stress during photosynthesis. It was observed that cedar trees along highways were reddish brown in color versus the bright green observed in state parks. If petroleum fumes decrease Vitamin C levels, the evergreen trees may not have sufficient Vitamin C remaining to maintain their good health. Therefore, this experiment examined levels of Vitamin C in evergreen trees along highways (stressed) and evergreen trees in state parks (healthy) to test the hypothesis that petroleum fumes may cause oxidative stress in evergreen trees along highways. In this case, lower Vitamin C levels would be an indicator of the oxidative stress. Evergreen needles were collected and Vitamin C was extracted by boiling needles in water for 20 minutes. Lugol's Iodine solution was calibrated against a Vitamin C standard with a 1% starch solution added to the reaction to indicate the end point. The Vitamin C solutions from the cedar trees were then titrated. Cedar trees along highways had an average level of 2.14 mg Vitamin C per g sample and cedar trees in state parks had an average level of 2.59 mg Vitamin C per g sample. Statistical analysis using the T-Test indicated this was a significant decrease. This supports the hypothesis that petroleum fumes may induce oxidative stress in cedar trees resulting in visible signs of stress (brownish needles).

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