A Study on Sustainable, Environmentally-Friendly, Alternative Insulators

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Cattails and Milkweed have been historically recognized for their insulting abilities; however, their natural effectiveness as insulators has never been truly applied on a large-scale level. While conventional insulators - such as foam board or fiberglass - are often composed of fossil fuels, plant based insulators, such as Asclepias and Typha, are sustainable and far less costly. In this project, the insulating abilities of two alternative insulators, Asclepias (milkweed) and Typha (cattail), were calculated, analyzed, then measured against foam board, with an end goal of identifying a practical replacement for the costly, unsustainable, but traditional insulators that are common across the world. To complete this task, a conduction chamber was designed and constructed for the purpose of testing the performance of each insulator. By determining the thermal resistance of each, one could then compute conductivity and R-value using mathematical equations. It was hypothesized that if the fibers of Typha and Asclepias are placed separately into a conduction chamber, then Asclepias will yield a lower thermal conductivity and higher R-value, thus serving as a better insulator. This is believed to be due to its long, thin fibers and high porosity. After completing experimentation, the hypothesis was confirmed, as milkweed fibers were found to perform better as an insulator than those of the cattail plant. This was evidenced by Asclepias's superior R-value, and lesser thermal conductivity. However, the most notable deduction from experimentation was the relatively minuscule gap between the performance of foam board and milkweed. From this finding, it was concluded that milkweed fibers could serve as a suitable alternative to foam board.

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