The Extent to Which UV Filtering Compounds Inhibit Hydrophyte Photosynthetic Systems

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Increased use of personal care products has raised concerns about their environmental impact due to the release of chemical residues into natural ecosystems. Sunscreen compounds enter aquatic and terrestrial environments through runoff, yet their effects on plant photosynthetic function remain insufficiently characterized. This study investigated whether exposure to sunscreen reduces photosynthetic rate in plant tissue using a controlled leaf disk assay. Spinach leaf disks were vacuum infiltrated and submerged in sodium bicarbonate solution to quantify oxygen production during photosynthesis. Experimental groups were exposed to commercially available sunscreen formulations with sun protection factor 50, while untreated disks served as controls. Photosynthetic rate was assessed by measuring the time required for 50 percent of leaf disks to regain buoyancy over a twenty minute period. Leaf disks exposed to sunscreen demonstrated significantly reduced photosynthetic rates compared to controls. A two sample t test indicated a statistically significant difference between treated and untreated groups ($p < 0.001$). Control disks reached 50 percent buoyancy at 6.5 minutes, whereas exposed disks required an average of 15.83 minutes, corresponding to a 143.6 percent decrease in photosynthetic efficiency. These results indicate that sunscreen exposure significantly inhibits photosynthesis in spinach leaf tissue under experimental conditions. The findings suggest that sunscreen residues may negatively affect plant productivity and warrant further investigation into the specific chemical components responsible and their environmental concentrations.

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