A Novel Application of Gold Nanoparticles to Increase the Efficiency of Plant Photosynthesis

Nelson, Alexander (School: Nelson Home School)

As the human population swells, sustainable food sources become increasingly important. This novel project determines the effects of ultrasonically diffused Gold Nanoparticles (AuNPs) on the growth of a plant. The hypothesis is by applying AuNPs onto leaf surfaces, the AuNPs act as an electrical conductor for the plant and increase the electron energy transfer speeds, thereby increasing the rate of photosynthesis. This then increases the agricultural biomass yield of a plant in a shorter period. By using an ultrasonic diffuser and tubing to direct diffused AuNP, a series of five Lactuca sativa plant sections were tested. Two separate negative control tests sets were conducted to isolate the AuNP variable; a completely controlled (watered only) test and a filtered water misted plant test. Each test set was comprised of two containers of Lactuca sativa plant specimens. Four plants were randomly selected from each container and weighed. On average the AuNP misted plants weighed more (0.13g) than the controlled plants (0.094g) and the Water misted plants (0.083g), and was verified with a t-test. The hypothesis was accepted, as the AuNP mist increased the wet biomass of the plants over a designated period and therefore demonstrated an increase in the photosynthesis rate. Further research includes locating AuNP deposits in the plant tissue using an electron microscope and using electronic instrumentation to measure the plant's photosynthesis rate. This finding facilitates the speed of manufacturing crops to accommodate human population expansion.

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