Improving Shade Balls

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The objective of this project is to determine how effective changing the shape of a spherical shade ball to a tessellational dodecahedron is at decreasing evaporation and algal growth. Shade balls, large quantities of black plastic spheres, are used to blanket reservoirs to reduce evaporation. It was hypothesized that dodecahedra would reduce evaporation and algae significantly more than spheres. This was predicted because dodecahedra are tessellational and nest closely while spheres allow gaps for evaporation. The researcher gathered 12 bins and 180 shade balls, and manufactured 180 dodecahedra using silicone molding and rigid foams. The researcher evenly designated each bin as either dodecahedron, shade ball, or control (not covered) with color coded and numbered millimeter scales on each bin to measure water depth. The researcher exposed the bins outdoors for three, ten-day trials, gathering water level, temperature, and clarity (algae) data. A rain gauge was measured daily to subtract from the bins' water levels. The significance of differences in the trials was determined using ANOVA and t-Tests. Dodecahedron evaporation was 36% less than the control and the 21% less than the shade ball (p=AN 6E-14 TT 3E-11). Dodecahedron water was one deg-C warmer than the sphere and two deg-C warmer than the control. Using a colorimeter, water clarity of the dodecahedra bins showed less algae than the spheres (p=6E-04). All of the data shows dodecahedra to be significantly better at preventing evaporation and algal growth and the hypothesis was confirmed. Interesting future studies would be to change the color to white for less heat absorbence, and to observe effects on mosquito eggs or larvae in the water.

Awards Won:

Fourth Award of $500