Why So Dry? Comparing Hydrogels to Conserve Water in Soil

Trees, Mateya (School: San Angelo Home School)

The purpose of this study was to test different hydrogels made by the researcher and compare how much moisture they held in soil. The researcher wanted to find an alternative to polyacrylates, a synthetic hydrogel used in gardening and farming. Polyacrylates have been criticized for being nonbiodegradable and toxic. In contrast, biopolymers such as sodium alginate and xanthan gum are biodegradable and safe for plants, animals, and humans. Four different hydrogels were tested in loamy soil: Polyacrylate, Sodium Alginate, Xanthan, and Cornstarch. The dependent variable was moisture level as measured by a Soil Master Water Meter, which measures moisture at levels of 0-10. Readings were taken once a day for 23 days. The researcher hypothesized that different hydrogels would hold different amounts of moisture in the soil when compared to a Control group that had no hydrogels added. The means for each group were: Control=2.96; Polyacrylate=6.52; Sodium Alginate=3.70; Xanthan=8.17; Cornstarch=5.70. Results from t-tests of the means for each group found that Polyacrylate, Xanthan, and Cornstarch were significantly different from Control ($p<.05$). The mean for Xanthan was not significantly different from Polyacrylate ($p=.051$). Xanthan held moisture in the soil for 22 days compared to 18 days for Polyacrylate. When comparing the cost for 1 cup of hydrogel, Xanthan cost $2.15 and Polyacrylate cost $6.75. The researcher concluded that Xanthan can be a sustainable solution for holding moisture in soils. She hopes this study will help her develop an environmentally-friendly soil amendment for farming and gardening.

Awards Won: