Peanut Shells Reimagined: Creating Value Added Cellulosic Material

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This experiment is continuation of my earlier research evaluating the feasibility of converting waste peanut shells into value-added cellulosic materials. The objective is to extract purified cellulose from discarded peanut shells and use it to develop a cellulose-based biodegradable hydrogel capable of enhancing soil moisture retention and supporting improved plant growth in water-limited environments. In this phase, I expanded my work by additional analysis of water retention potential, reswelling kinetics, cross linking properties, and green house experiment on cotton plants. To prepare hydrogel, peanut (Arachis hypogaea) shells were ground to a fine powder and digested with nitric acid. The samples were then washed, filtered, and stored. It was then subjected to oxidation process to obtain reactive cellulose. The reactive cellulose was then mixed with carboxymethylated chitosan as a cross linker to obtain hydrogel. Microscopic images were captured to examine the surface morphology of ground peanut shells and the resulting hydrogels. Replicated hydrogel samples were used to evaluate water retention value (WRV). In conclusion, cellulose fibers were successfully extracted from waste peanut shells, and a cellulose-based hydrogel was formulated. Ongoing experiments are focused on analyzing reswelling kinetics and assessing the hydrogel's impact on soil moisture retention and cotton plant growth. Successful validation of this work will further strengthen its potential for sustainable agricultural applications.

Awards Won: