A Novel Approach to Increasing Crop Yields: Effects of Soybean Curd Residue on Soil Productivity

Wang, Ella (School: BASIS Chandler)
Tang, Breanna (School: BASIS Chandler)

This project explored the potential of utilizing soybean curd residue (SCR) to increase soil productivity and drought resistance by analyzing its effects on the nitrogen and potassium concentrations, water holding capacity, and permeability of soil. A few hundred million tons of SCR are generated annually from the manufacturing of soybean products. Currently, this waste material is dumped into landfills, which poses environmental problems because it is highly susceptible to putrefaction and releases methane. In this investigation, different concentrations of SCR in soil and two types of SCR, wet and dry, were tested to determine what maximized soil productivity. The results of this study revealed that adding SCR to soil raises nitrogen and potassium levels from Depleted to Sufficient, with around five to six times higher concentration of each nutrient than the control. SCR lowers the permeability of soil and significantly increases water holding capacity. Compared to the control, soils with SCR retained over triple the amount of water for up to ten times longer. The elevated concentrations of nitrogen and potassium, which are limiting nutrients, in soils with SCR substantially enhance soil fertility, which allows for better plant growth. Higher water capacity assists in relieving drought and prevents the leaching of nutrients, and lower permeability inhibits rapid water drainage, giving plants more time to absorb moisture. This project presents a practical, cost-effective method to enhance soil productivity and resistance to drought while reducing wastes that negatively impact the environment, and has the potential to overcome food crises around the world.

Awards Won: