

Cover Crop Influence on Soil Health and Peanut Production in Alabama

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The southeastern United States has a long history of soil degradation, and cover crop utilization has the potential to restore soil productivity in crop production systems. Cover crops have been shown to increase soil organic matter, improve soil structure, and enhance nutrient-use efficiency. A study was established in 2017 at two locations in Alabama (WREC and TVREC) to examine the impact of cover crops on dynamic soil health indicators. Cover crop treatments including monocultures and combinations of cereal rye (*Secale cereale*), crimson clover (*Trifolium incarnatum*), and Daikon radish (*Raphanus sativus*) as well as a fallow treatment were arranged in a randomized complete block design in cotton-legume cash crop rotations. Soil health indicators measured included permanganate oxidizable carbon (POXC), soil organic carbon (SOC), water stable aggregates (WSA), and soil strength (AUCC.I.). These soil properties as well as cash crop yield and cover crop biomass have been evaluated over a period of four years (2018-2021). At TVREC, SOC increased in the top 5 cm of soil over the four-year period, and some cover crop treatments were able to increase SOC and POXC compared to the fallow control. At WREC, SOC and POXC showed little effect due to cover crop treatment. WSA did not improve with cover cropping at either location. AUCC.I. results showed a relationship between higher biomass production and reduced soil strength, and many cover crop treatments were able to improve AUCC.I. Cotton yield was higher in almost all cover crop treatments than the fallow at TVREC after four years of cover cropping, but WREC did not show an effect on cotton yield. Peanut yield was lower following clover cover crop compared to the fallow in 2019, but rye, radish, and fallow treatments had similar yields. Utilization of cover crops shows the potential to improve soil health depending on the soil type, cover crop, and management system.