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The Economic & Environmental Benefits of Peanut Production
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As a legume, peanuts provide a nitrogen to the soil in the year subsequent to when another crop, such as cotton, is planted. As a result, growers may reduce the use of nitrogen fertilizer and benefit from higher returns the year that cotton is planted after peanuts. This research tests this hypothesis and develops a bioeconomic model that compares economic returns in a peanut-cotton rotation and a cotton monoculture. As a byproduct of the research, environmental implications consisting of nitrogen levels in runoff are also estimated for both scenarios as an indicator of non-point source pollution. The evidence, from the bioeconomic model suggests that growers who alternate cotton with peanuts will increase net returns by 14% in the long run, a 25 year time horizon. Additionally, these growers will experience a reduction a six percent of nitrogen released into the watershed.

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Rotation of Peanuts and Cotton for Optimal Nitrogen Application

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The study was conducted in collaboration with the National Soil Dynamic Laboratory in Auburn, AL. We implemented a sophisticated bioeconomic model that is used to prescribe the optimal nitrogen rate that cotton farmers should apply if they cultivate peanut as a complementary crop. The idea is that farmers who rotate peanut and cotton can count on nitrogen credits derived from the previous peanut land use. The bioeconomic model consists of two mathematical models: (a) a biophysical model that simulates the agricultural activities at the watershed level, (b) an economic model that is linked to the previous model that allows us to study the interaction between human decisions of economic nature and the quality of the environment. The bioeconomic model was calibrated using data from the Economic Research Service of USDA, environmental data from the Grassland Laboratory, National Resource Conservation Service and Cropland Data Layer of USDA to forecast 25 years of farming activities in the agro-ecological area of Monroe County in Alabama. Such a county represented an optimal case study because cotton and peanut are the most common crops grown in that area. Our findings suggest that a rotation scenario peanut-cotton would lower farming costs by 14% and reduce non-point source pollution from nitrogen runoff by 6.13% compared to continuous cotton farming. A second phase of the project is the development of geographic information system (GIS) maps of current peanut and cotton production and processing facilities. With this information, we have identified areas, beyond Monroe County, that are best suited for the implementation of the peanut-cotton rotation program.