

Public Abstract

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Title:THREE ESSAYS ON WATER MANAGEMENT STRATEGIES IN RESPONSE TO CLIMATE CHANGE

Climate change will affect the amount of rainfall and its temporal and spatial distribution, thus affecting water availability. As a result, both households and farmers need to adapt to climate change by taking appropriate actions. Adoption of drought tolerant plants (DTPs) is analyzed using survey data on 624 households in Missouri. DTPs adoption is positively correlated with both low and high household incomes, homeownership, living in rural subdivisions, mowing lawns high, time spent on yardwork, pro-environmental attitudes, and concern about droughts.

Using data from the 2013 Farm and Ranch Irrigation Survey conducted by USDA, this dissertation also employs a mixed and multilevel approach to analyze both farm- and crop-specific irrigation decisions of farmers. The results from multilevel models (MLMs) suggest that adoption of pressure systems and scientific scheduling practices is affected by water cost, land area, use of on- and off-farm surface water, various barriers and information sources. The variability in pressure irrigation adoption is mainly accounted for by factors at the state level, while the adoption of scientific scheduling practices is mainly accounted for by farm-level variation. In addition, MLMs are further applied to analyzing the multicrop production decisions and economic irrigation water use efficiency. The results show use of pressure irrigation encourages efficient water use on soybeans, and higher water price increases efficiency on both corn and soybeans. Variables representing deviations from 30 year average state weather conditions in 2012 and 2013 have fairly consistent effects. Climate risks and higher temperatures promote more efficient water use and higher yields.