

Public Abstract

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Title:ENSO AND PDO CLIMATE VARIABILITY IMPACTS ON REGIONAL MISSOURI CROP YIELDS

An analysis of crop yields for the state of Missouri was completed to determine if an interannual or multidecadal variability existed as a result of the El Niño Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Corn and soybean yields were recorded in bushels per acre for each of the six climate regions of Missouri. An analysis using the Mokhov "method of cycles" demonstrated interannual, interdecadal, and multidecadal variations in crop yields. Cross-spectral analysis was then used to determine which region was impacted the greatest by ENSO and PDO influenced seasonal (April – September) and monthly temperature and precipitation. Interannual (multidecadal) variations found in the spectral analysis represent a relationship to ENSO (PDO) phase, while interdecadal variations represent a possible interaction harmonic between ENSO and PDO. A cross-spectral analysis was also completed using annual Southern Oscillation Index data and annual mean values for the PDO index in order to verify that an interdecadal variation exists between ENSO and PDO. Average crop yields were then calculated for each combination of ENSO and PDO phase, displaying a pronounced increase in corn and soybean yields when ENSO is warm and PDO is positive. Climate regions 1, 2, 4, and 6 displayed statistically significant (90% confidence level) differences in yields between El Niño and La Niña years, representing 55-70% of Missouri soybean and corn productivity, respectively. Final results give the opportunity to produce seasonal predictions of corn and soybean yields, specific to each climate region in Missouri, based on ENSO and PDO phase.