

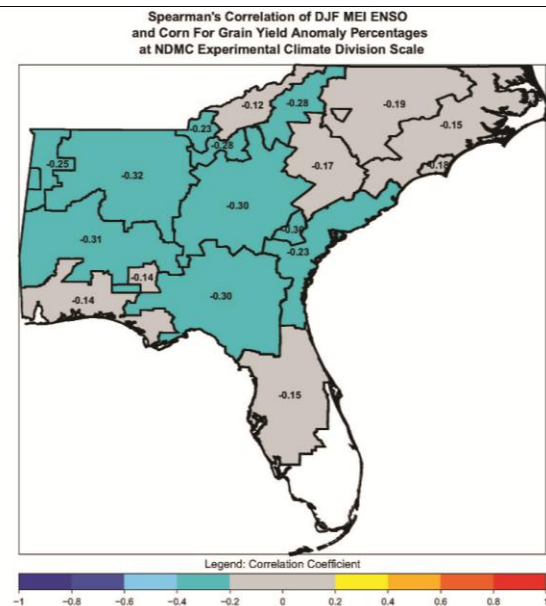
The Relationship between ENSO and Crop Yields in the Southeast US

THE NEED

Short-term weather and long-term climate patterns are a driving force for agricultural production and play a key role in production risks. El Niño Southern Oscillation (ENSO) is the only predictable seasonal oscillation and has been linked to shifts in temperature and precipitation across the Southeast US. These shifts can influence growth of crops, such as peanuts, cotton, and corn, which are economically important in the region. Stakeholders need to know the relationship between ENSO and crop yields to assist with making economically viable decisions and to achieve better management practices.

SERVING THE NEED

In most cases, ENSO accounts for less than 25% of variance in crop yields and thus, does not appear to be a good predictor of summer yield in the Southeast US. Overall, corn exhibits the strongest relationship with seasonal ENSO periods, which is consistent with results from Hansen et al. (1998) and Royce et al. (2010), although most magnitudes are less than the absolute value of +/-0.50. The relationship between summer corn yield anomaly percentages and the preceding winter or spring Multivariate ENSO Index (MEI) values at all spatial scales is stronger than that of summer corn yield anomaly percentages and growing season MEI values. Thus, pre-growing season MEI periods may be a better indicator of summer corn yield. The relationship between summer corn yield and winter or spring MEI values is negative which suggests that higher than normal yields occur following a MEI La Niña winter or spring while lower than average yields are observed following winter or spring MEI El Niño periods. For further exploration of this relationship, MEI is the recommended ENSO index and National Drought Mitigation Center clustering is the recommended spatial scale of study.



IMPACT

Growers, researchers, and agricultural extension agents should be aware that pre-growing season values of MEI have a higher correlation with summer corn yield than growing season values of MEI and yield. Since higher than normal yield occurs following a La Niña winter or spring but lower than average yield occurs following an El Niño winter or spring, growers can consult the winter or spring ENSO phase forecast when making seed purchases during fall. However, while ENSO is a good predictor of temperature and precipitation patterns in the southern US during winter season, agricultural

professionals are not recommended to rely solely on ENSO (winter, spring, or summer values) as guidance for summer crop yields.

PARTNERS & SUPPORT

Climatic and crop yield data were used in this study, with sources of data including COAPS, NOAA's CPC, NOAA's ESRL, JMA, and USDA. This guidance is offered in close collaboration with faculty in the Crop Science Department at NC State University and the Southeast Climate Consortium (SECC).