

Impacts on Agriculture of the El Niño Southern Oscillation (ENSO) in the Southeastern U.S.

The El Niño Southern Oscillation (ENSO) describes the variable surface temperatures and atmospheric conditions in the Pacific Ocean near the equator. ENSO is the most significant source of seasonal and inter-annual climate variability in the Southeastern U.S., and information about ENSO is the leading factor in many seasonal climate forecasts.

La Niña

Row Crops: ENSO impacts are less evident on annual summer crops since the strongest signal occurs during fall, winter and spring. Warm conditions associated with La Niña may help certain pests and diseases. Warm, dry winter may increase flower thrips abundance and may provide ideal growing conditions for these and many other host plants. Warm conditions may also help soybean rust over-winter in some areas. Dryland corn growers may consider waiting to plant until near May so that summer rains may be occurring during pollination.

Small Grains and Winter Cover Crops: In SC and AL, wheat usually performs better during La Niña years than El Niño years. Wet seasons delay planting and affect crop yield potential. Cover crops may be established earlier in the fall and terminated earlier in the spring to conserve limited soil moisture.

Winter Vegetables: Tomato and green peppers generally have increased yields. Dry weather associated with La Niña can decrease fungal and bacterial diseases and help growers reduce the number of fungicide applications, however viruses caused by thrips and white fly can be problematic. High nighttime temperatures (above 65°F) can be a problem for fruit setting.

Pasture: Success of winter pastures depends on rainfall. This is especially true when overseeding. Overseeding of cool-season annuals into established may fail due to insufficient moisture. This practice is generally not recommended unless irrigation is available as dry conditions can be exacerbated during La Niña seasons.

Temperate Fruits: Insufficient chilling requirements can be a problem as a result of a warmer-than-average winter. Drier conditions usually mean less fungal diseases such as Anthracnose and Botrytis fruit rots, major concerns in strawberry production. Regular applications of fungicides may not be needed as often to suppress these diseases, so this season may bring a good opportunity for growers to extend spray intervals and reduce fungicide costs without a great risk of compromising their profits.

El Niño

Row Crops: Impacts on most summer annual row crops are mixed. However, corn yields are usually about 20% lower than average, likely as a result of increase spring cloudiness. Peanut yields may be reduced under El Niño as a result of increased TSW virus. Rainy conditions beginning in fall season may delay harvests and planting of winter crops.

Small Grains and Winter Cover Crops: Late planting of winter crops could reduce the risks for Hessian Fly and Aphid reproduction early in the season as well as winter population increases. Increased rainfall may lead to water logged soil, reducing root growth and causing N and P deficiencies. Increased exposure to low temperatures in the early part of the winter (Nov-Jan) may accelerate flowering, especially those varieties with high vernalization requirements. In contrast, increased rain may reduce tillering in clay soils with high water holding capacity or soils with poor drainage. In areas with poorly drained soils, growers could expect yield reductions.

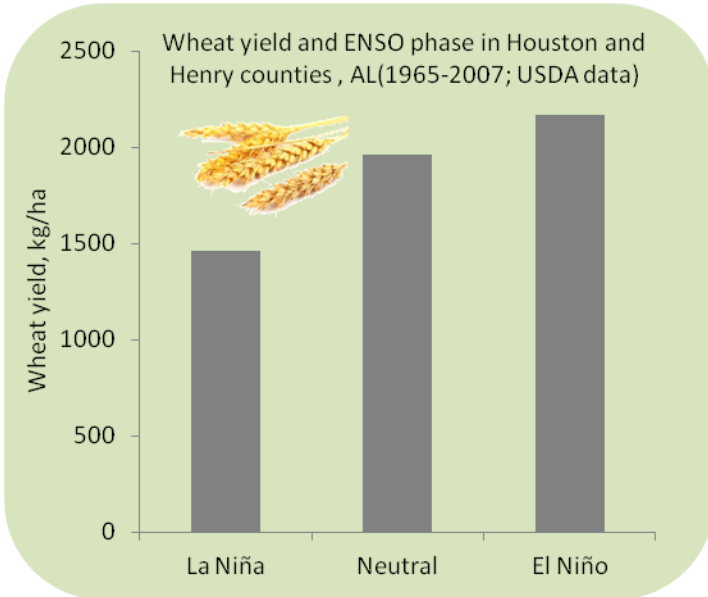
Winter Vegetables: Tomato and green peppers generally yield less during El Niño years. Pathogens, fungal and fruit quality problems can be increased as a result of the wetter conditions. Nutrient management can also be affected by a wetter winter/spring as there may be more leaching losses of nitrogen.

Pasture: In general, El Niño years are good for winter pasture due to wetter conditions. However, growth may be slower due to increased cloudiness and consequent decrease in solar radiation.

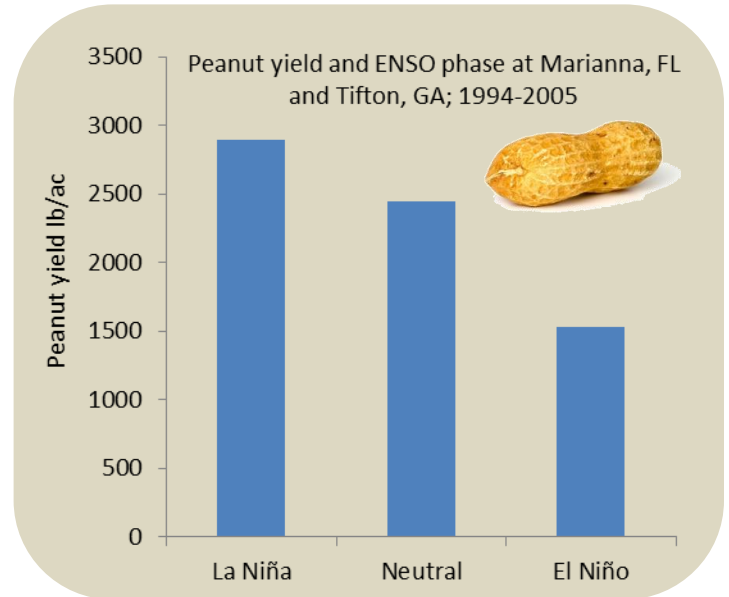
Temperate Fruits: El Niño conditions generally result in increased chill accumulation in the early part of the winter (Nov-Jan) and can reduce the need for dormancy-compensating sprays in peaches and blueberries. Cooler, rainier conditions may slow development rates in some perennial fruits, and may favor the development of fungal diseases such as Anthracnose and Botrytis fruit rots. Increased cloudiness may also affect growth in some cultivars.

Understanding the best management options for the ENSO phases is still a developing science. There are a variety of management options that could be adjusted based on ENSO phase, for example: *crop and variety selection, planting date, plant population, fertilization, timing of establishment and termination of winter cover crops, insurance coverage, input purchasing, and others.*

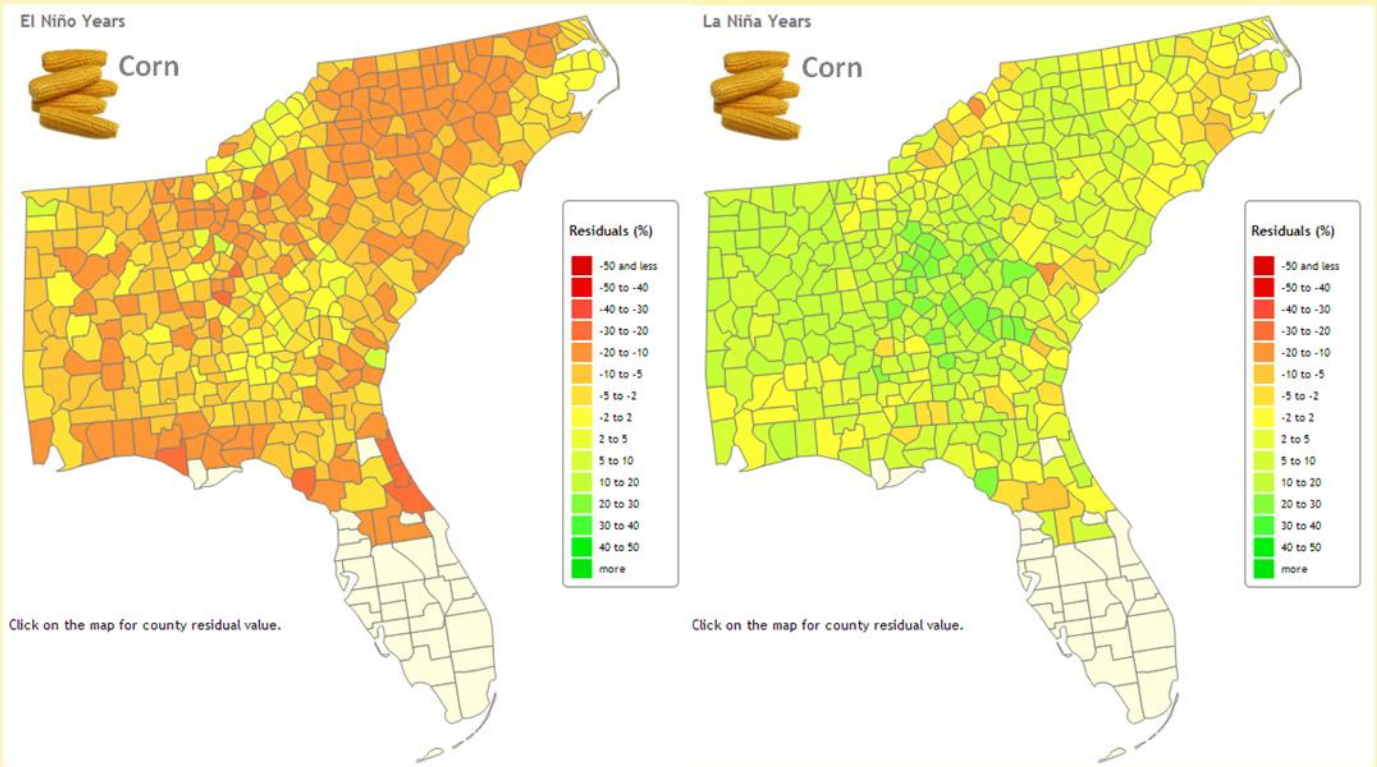
The following figures show some example of ENSO impacts on Southeastern agriculture for selected crops (winter wheat, peanut, and. More information can be found at www.AgroClimate.org/tools.php



Data from USDA NASS data: United States Department of Agriculture, National Agricultural Statistics Service. 1965-2007 county yields for winter wheat in Houston and Henry counties, southeastern, AL



Data from: Olatinwo RO, Paz JO, Kemerait Jr. RC, Culbreath AK, Hoogenboom G. 2010. El Niño-Southern Oscillation (ENSO): impact on tomato spotted wilt intensity in peanut and the implication on yield. *Crop Protection* 29: 448-453.



Percent differences in county-level corn yields from average yield for El Niño and La Niña phases. See more at: <http://agroclimate.org/tools/Regional-Yield-Maps/>