Incorporating Climate Forecasts into a Peanut Risk Management Decision Aid

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Weather conditions during the growing season are known to have a major impact on the occurrence and severity of pest outbreaks in many crops. A number of models which utilize daily weather data have been developed to quantify the effects of weather variables such as rainfall and temperature on pest dynamics. However, there has been little research to determine if an analysis of historical climate data and climate forecasts can be used to improve pest risk assessments and to modify crop management strategies to reduce risks.

We are investigating the potential for incorporating climate forecasts into an existing web-based pre-season planning aid for peanut producers (http://www.peanut.ncsu.edu/risk/). This program provides a quick, graphical view of the effect of changes in management choices, field history, and soil and environmental conditions on risk for each of seven disease, two arthropod, and three nematode pest species. Many pre-season decisions, such as variety selection, planting date, row spacing, tillage, and pesticide usage, impact more than one of these pests, often in conflicting ways: a choice which lessens the risk from one pest may heighten the risk of another. For most of these pest species, there are no prophylactic treatments, or the prophylactic treatments are expensive. The choice of the wrong cultivar or planting date can have serious consequences throughout the season.

Weather conditions throughout the growing season have a large impact on many peanut pests. For example, the severity of foliar diseases and the number of times during the season that fungicides are required are highly dependent on rainfall, temperature, and relative humidity. Favorable conditions for sclerotinia blight germination and infection include temperatures of 17-25C and greater than 95% relative humidity. Development of early and late leaf spot is favored by long (>8 hr/day) periods of high relative humidity and temperatures (18 to 27C). CBR (*Cylindrocladium* black rot) is more likely to be a problem in poorly drained fields, especially when moisture levels are high, either through rainfall or irrigation. Southern stem rot is also likely to be worse when moisture levels are higher from rainfall or irrigation. Above-normal temperatures in April and below-normal rainfall in June, July and August play a major role in encouraging spider mite outbreaks. Southern corn rootworm(SCRW) problems are more severe in poorly drained, loamy soils. High moisture levels, either from rainfall or irrigation, exacerbate SCRW problems.

By incorporating climate forecasts into the peanut risk management decision aid, we hope to improve our assessments of risk prior to planting. We are currently evaluating historical weather and crop yield data for North Carolina to determine the potential usefulness of climate forecasts for crop management decision-making in the Coastal Plain of North Carolina. By evaluating historical records of pest outbreaks and pesticide applications, and utilizing available models and what is known about pest biology and the effects of weather on these pests, we should be able to modify the risk index for the pests affected by weather according to climate predictions for the growing season.

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