Explanatory crop models have been developed to estimate yield, growth, and development of individual plants. These models have been implemented extensively at the field-scale; however, there is interest in applying explanatory crop models to regional-scale studies to estimate properties of food systems such as potential production capacity (PPC). These models are well-suited to the study of climate change effects on regional food security and potential mitigation strategies. Corn and potato yields were simulated at a county level over the U.S. eastern seaboard region (Maine to Virginia) using a geospatial interface that implements the crop models SPUDSIM and MAIZSIM. A spatially-referenced yield index (YI) was developed to combine the results from both models, create an estimate of baseline productivity over the region, and provide a simple numerical analogue for production potential. The sensitivity of this index was evaluated with respect to changes in management (planting and harvesting dates) as well as changes in climate (temperature, precipitation, and atmospheric carbon dioxide). Future climate was simulated by adjusting monthly statistics used by the weather generator CLIGEN based on downscaled global climate model data. The results of this study could be used by regional planners for anticipating the potential risks of climate change (CC) and evaluating different mitigation strategies such as modifying crop management.

This research was supported by the USDA-ARS Headquarters Postdoctoral Research Associate Program and the USDA-NIFA AFRI Grant #2011-68004-30057. Enhancing Food Security of Underserved Populations in the Northeast through Sustainable Regional Food Systems.

Objectives
- Evaluate the potential production capacity (PPC) for the ESR
- Quantify the PPC using an aggregated yield index (YI)
- Compare the YI over planting and climate change (CC) scenarios

Geospatial Crop Model Interface
1) Input data layers (weather, soil, management, land use) are georeferenced and organized in ArcGIS for the region of interest.
2) Spatially homogeneous modeling units (MUs) are created.
3) For each unique input combination, 30 independent growing seasons are simulated with SPUDSIM and MAIZSIM.
4) Output is spatially linked and aggregated to the county level. The top 3 MUs per county are used to reduce the number of simulations.