MICHIGAN STATE UNIVERSITY

The Soil Productivity Index:

taxonomically based, ordinal estimates of soil productivity

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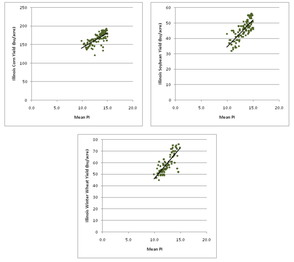
Validation of the Soil Productivity Index

Among other validation approaches with different data sets, 2009 crop yield data for 11 Midwestern states were used to evaluate the PI. In a GIS, we determined the soils and crops in particular fields, and thus were able to ascertain the mean PI value per soil, per crop, per county. These crop specific, mean, county level PI values were then compared with the county yield values reported by USDA-NASS. Statewide summaries of these data produced correlations among yields of specific crops and PI values that were all positive. Below are selected examples.

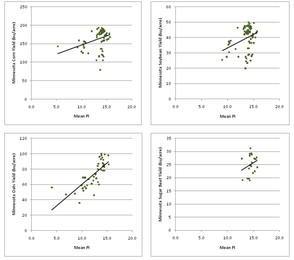
Illinois

Crop	R_2 value
Corn	0.73
Soybeans	0.75
Winter Wheat	0.78



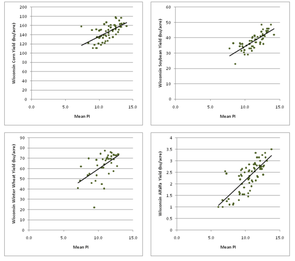
Minnesota

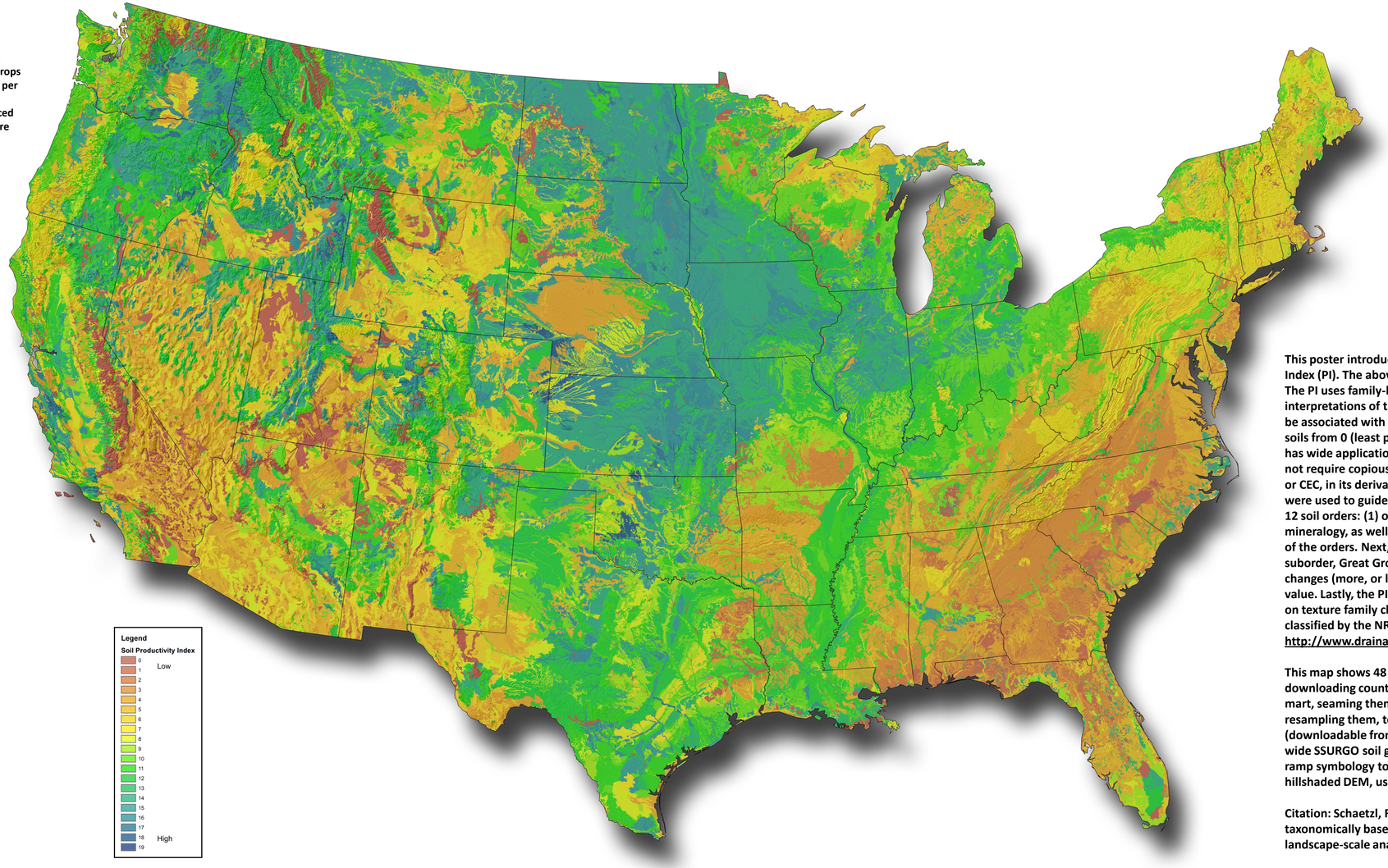
Crop	R_2 value
Corn	0.29
Soybeans	0.23
Oats	0.80
Sugar Beets	0.24



Wisconsin

Crop	R_2 value
Corn	0.55
Soybeans	0.78
Winter Wheat	0.60
Alfalfa	0.68





This poster introduces a new, ordinally based, Soil Productivity Index (PI). The above map shows the PI for the lower 48 states. The PI uses family-level Soil Taxonomy information, i.e., interpretations of taxonomic features or properties that tend to be associated with natural low or high soil productivity, to rank soils from 0 (least productive) to 19 (most productive). The index has wide application, because, unlike competing indexes, it does not require copious amounts of soil data, e.g., pH, organic matter, or CEC, in its derivation. To calculate the PI the following variables were used to guide initial assessments of productivity among the 12 soil orders: (1) organic matter content, (2) CEC, and (3) clay mineralogy, as well as our knowledge of general land use on each of the orders. Next, modifier values were assigned to each suborder, Great Group and subgroup, when these entries implied changes (more, or less) in overall productivity, relative to the base value. Lastly, the PI was modified by adjusting for texture, based on texture family classification. PI values for all soils currently classified by the NRCS can be accessed from the web site: http://www.drainageindex.msu.edu.

This map shows 48 statewide soil grids, each created by downloading county-scale SSURGO files from the NRCS soil data mart, seaming them together into a statewide mosaic, and then resampling them, to create a statewide grid file. PI values (downloadable from the web site) were then joined to each state-wide SSURGO soil grid in a GIS. We next applied our own color ramp symbology to the PI values and overlaid them onto a 240-m hillshaded DEM, using 30% transparency.

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