Corn Suitability Rating (CSR) Background and Update
September 2012

What is the Corn Suitability Rating?
The Corn Suitability Rating (CSR) system has been — and arguably remains — the most sophisticated and complete quantitative soil productivity ratings available anywhere in the United States and the world. As a resource, it certainly has been the most trusted. CSR is an index that rates soil map units for their potential row-crop productivity. Early concepts for rating productivity date back to the 1930s by Iowa State University (ISU) scientists. A major advance came in 1971 with an ISU publication describing CSR authored by Dr. Thomas Fenton, professor of agronomy at Iowa State University, and several colleagues. CSRs are based on inherent soil properties to depth of 60 to 80 inches, average weather and the potential of different kinds of soil for row crop production. The CSR reflected the scientists' extensive expert knowledge of these areas, modern statistical methods and a multiyear, detailed analysis of the productivity of Iowa’s 30 million acres of farmland.

Does CSR have ties to Iowa legislation?
Often overlooked is the fact that the CSR system was established first and foremost as a response to State of Iowa legislation (Code of Iowa, Section 441.21, 1e and 1f) that requires farmland assessments be based on earning capacity and productivity and that modern scientific soil surveys be used to determine equitable valuation. All other ways that CSRs have been used — predicting yields, cash rents and land-sale values — are byproducts of this original intent and a mark of the quality of science that created it.

What has changed since the CSR was introduced in the early 1970s?
Since 1971, from a technical point of view, the knowledge base of soil properties has been significantly enhanced and expanded. In addition, the science and sophistication used to classify soils has changed and expanded during this period, providing for a more robust method to calculate CRSs. For example, the variability of different soil series within each soil map unit is now recognized and recorded as percentages, which was not the case in earlier years of CSR.

Is Iowa State planning to change the CSR?
Iowa State University has been considering a new method to determine CSR values for Iowa soils. This effort, called “CSR2,” would have an overall aim of getting at the same CSR values with greater transparency, consistency and ease. A key feature would be to provide a system so that any interested person — a county assessor, farmer, realtor or other — readily and clearly understands the overarching factors that undergird the index. Generally, the overarching factors in considering CSR2 are:
- Inherent soil properties;
- specific field conditions captured by each soil map unit;
- soil depth (60 to 80 inches, unchanged from CSR);
- local climate and environment;
- and expert judgment.
What does “expert judgment” mean?
Expert judgment reflects the fact that soil productivity is a complex property that extends beyond simple soil morphology, site conditions and local climate. As in the preceding decades of CSR, Iowa State University wants to continue to ensure that the best scientific knowledge in soils and agronomy is applied in determining meaningful CSR values. Expert judgment factors will be decided by mutual agreement of local USDA Natural Resources Conservation Service (NRCS) soil scientists and the Iowa State University Experiment Station soil survey coordinator. Expert judgment decisions will refine the calculated CSR2 for some soil map units. Decisions will rely on synthesizing information across a range of other soil parameters, including known systematic distributions of parent materials such as loess or pedisediment and locally important root restrictive zones such as clayey horizons and similar abrupt changes with soil series. For some soil map units, notable differences between CSR and CSR2 will occur because the minority soil series will be of significant variance compared to the dominant soil series. However, in other counties where the same soil map unit occurs, the difference between CSR and CSR2 will be insignificant or the same because the dominant soil series will have minimal variability.

What other key features are involved with CSR2?
Another key feature is the use of simple weighted average values for each soil map unit in Iowa. There are 10,669 soil map units in Iowa, and they are more complex than many users of soil surveys realize. Why? Because a typical soil map unit routinely contains a dominant soil series and one or two minor soil series. The weighted average will use soil map unit data collected by NRCS Soil Survey personnel as soil maps are updated. Because today’s official soil surveys are web-based documents maintained by the National Cooperative Soil Survey, another CSR2 goal would be to ensure rapid updates are made available in an online knowledge resource, when new soil series or new taxonomic classifications are created or reclassified across Iowa.

What is the expected impact of CSR2?
The expected impact of converting to CSR2 will be small. As with CSR, it uses the best soil science possible to evaluate land productivity. What’s particularly advantageous is that CSR2 has CSR as a reference point and historic link. This allows CSR2 to be measured relative to an outstanding, universally trusted reference for equitable farmland valuation. CSR2 is meant to be nearly identical to the currently used CSR values. When all 10,669 soil map units of Iowa are compared, the average difference between CSR and CSR2 is 0.3 points. A specific example is the Clarion soil series, a major soil in corn production areas that extends from Des Moines north to the Minnesota border and from Carroll east to State Center. Comparing CSR and CSR2 values, the average difference for Clarion is -0.5 points, which is nearly ideal. It is important to note that about 15 percent of Iowa’s soil map units will have CSR and CSR2 values differing by 15 or more points. This is mainly due to the complexity of some soils, especially a soil map unit containing two very different kinds of soil. For these soils, experts will review and determine if available data merits the differences.

What comes next for CSR2?
ISU has been actively reviewing CSR2 for quality control and will prepare more information to distribute before the end of the year. Its availability on the NRCS Web Soil Survey will ensure it is consistent with continually updated soil surveys. ISU faculty will submit a paper describing CSR2 to a refereed journal for external review and publication.