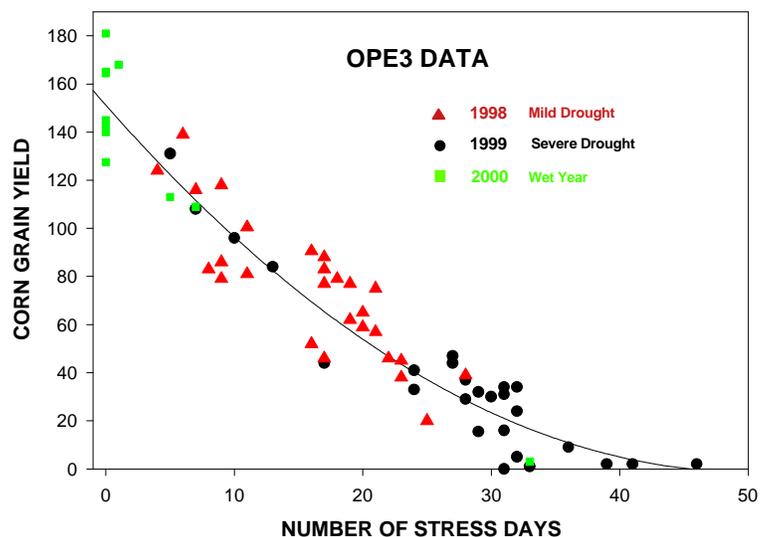
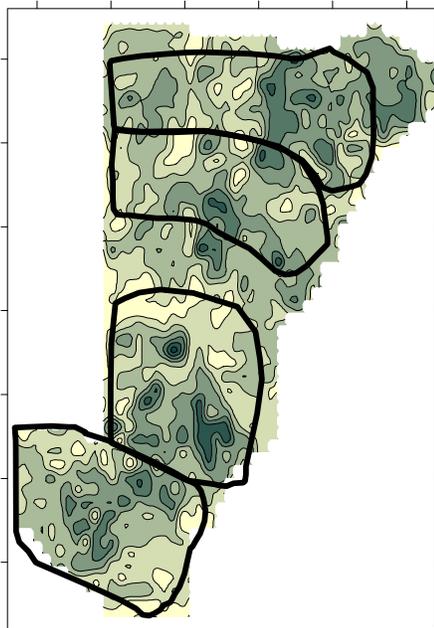


Identifying Crop Production Management Zones

Plant growth and yield are to a large extent dependent upon soil water dynamics. If the soil is too dry, plant growth is limited and yields are reduced. On the other hand, if the soil is saturated the roots of most production crops, like corn, cannot breathe and yields will suffer. Soil physical properties (i.e., soil texture, bulk density) alone are not good predictors of plant-available water. Much of the difficulty in describing plant-available water arises from the dynamic nature of plant roots in exploring the soil profile and extracting water. The quantity of plant available water in the soil profile is a function of several soil properties, landscape position, root density distribution, and evaporative demand.



Scientists at the OPE3 site have developed a plant stress indicator based solely on soil water dynamics. The OPE3 yield map (left) is typical of the variability encountered in many agricultural fields. The plant stress indicator recently developed by these ARS scientists shows an excellent relationship with yield over three different climatic conditions (figure on the right). Note 1998 was a mild drought, 1999 a severe drought and 2001 was an optimal year for soil moisture.

Critical soil properties and landscape characteristics that govern yields under a given climatic condition will be identified and used in a model as surrogate indicators of yield. In time, farmers will be able to use the same surrogate indicators to identify different management zones within their own farm land and optimize their yields.

Contacts: Timothy Gish tgish@hydrolab.arsusda.gov
Craig Daughtry cdaughtry@hydrolab.arsusda.gov
Charlie Walthall cwalthal@hydrolab.arsusda.gov

Link to Publications: