

TELCK, ALAN B^{*}, and PETER J. HICKMAN, Holly Sugar Corporation, 1967 West Fifth Street, Sheridan, Wyoming 82801. **Sharing Data using GIS Applications over the Internet.**

Abstract:

The practical application of data has typically provided challenges to decision-making. Some of the challenges to using data include access, timeliness, accuracy, and the ability to interpret and handle the sheer volume of data. Improvements in Geographic Information Systems (GIS) technology and the upsurge in Internet usage are providing us with tools that help us rethink our approach to data collection, analysis, and distribution. Imperial Sugar Company is utilizing a corporate Extranet and GIS technology to collect and distribute data interactively among our agricultural departments and our growers. This new technology is improving access, timeliness, accuracy and data interpretation. Discussed is specifically how Imperial Sugar Company is using GIS and the Internet to securely share data between the agricultural departments and the growers with whom we contract.

Discussion:

The Internet as it has been developed today provides an unique opportunity to improve grower and staff access to data and communication. According to the USDA-National Agricultural Statistics Service, 52% of all US farms with sales over \$250,000 had Internet access in 1999 (www.usda.gov/nass). This is an increase of greater than 50% over the number of farms having Internet access in 1997. Internal surveys conducted within Imperial Sugar Corporation indicate that an even higher number of farms growing sugar beets now have Internet access. Recognizing this, Imperial Sugar has developed a very large Internet site containing information and data for use only by our staff and contracting growers. This site contains a complete on-line sugar beet production guide, local weather, updated sugar beet news, an internal communications board and much more. Secure access to grower specific agriculture data is also provided. Much of this data is provided in cartographical format made possible through the use of GIS (Geographic Information Systems).

GIS is not new technology. It was first developed in 1969. However, recent improvements in computer technology including processor speed, memory, and displays have allowed GIS to advance to where is it now routinely employed on desktop systems. Furthermore, recent improvements in Internet technology, especially browsing software made Java and Javascript capable, now allow GIS to be employed over the Internet. This means that data that was once only accessible to persons with specialty software, is now available to nearly everyone in a graphical format over the Internet. This format is easier to interpret and understand.

To employ this technology, our staff first needed to link tabular data to a spatial reference. For most of our areas we chose to link a contract number with a physical location of the sugar beet field(s) grown under this contract. This was achieved either using GPS data to draw the field or by manually digitizing the data onto an aerial or digital raster graphic basemap. GPS data is preferable in cases where exact location and

acreage are needed. In other cases, digitization suffices for tracking production on a particular piece of land. Digitization, albeit less accurate than GPS, is a more rapid technique for tying field location to tabular datasets.

Once the fields and the data are spatially referenced, the GIS allows users to easily obtain information on individual tracts of land or query the database for an entire growing area. Maps are rapidly generated that help show trends in production and visually identify relationships among data. This greatly aids decision-making processes and helps users share data in an easier to understand format with others.

Spatially referencing data has also enhanced our original databases because now environmental data can be included to help with data interpretation. This type of data includes mapped soil survey information, elevation, and weather data. Relationships from this type of data are helping us to build robust crop models to aid variety development, pest and disease alerts, and sugar beet quality. Besides helping with weather data such as growing degree days, our weather maps show us in near real-time where and how much precipitation has fallen throughout a growing area. Additionally, we are able to specifically identify the sugar beet fields that may have been affected by a severe weather event such as hail or frost.

The Internet allows us to share this information with our growers rapidly. Many times this information is posted on our website (www.sweetbeet.com) sooner than growers receive the information by traditional print or radio media. Growers now have 24 hour access to their production data and are able to improve upon their crop record keeping system by submitting additional data on-line. We believe that this is actually improving the accuracy of the data, which in the past was collected in the field. Individual production data is secure and requires a password to access. A library of information is available on the site that helps growers obtain more information that may arise as a result of on-line query of their production data or because of an alert generated from a GIS crop model. The Internet helps display data intuitively and allows us to rapidly communicate with our growers 24 hours a day.

Summary:

By combining GIS technology with the Internet, Imperial Sugar Company is changing the way agricultural data is accessed and analyzed. GIS allows us to integrate environmental variables, including soil, elevation, and weather data, with our production data. This is helping us make better decisions because we can see relationships easier, develop more robust crop models, and direct our activities to our greatest production challenges. The Internet provides the medium through which our staff and growers utilize GIS, obtain a library of information and communicate 24 hours a day.