George Orwell may have had it right in his classic book, “1984.” Big Brother is watching, but in this case, he has his eye on your corn and other crops. We were first exposed to impressive accuracy of satellite imagery in the government released intelligence photos leading up to the U.S. invasion of Iraq. While a different type of imagery, the technology is now being used to predict crop yields very early in the growing season and long before USDA releases its first field-based estimates.

Jude Kastens is a senior research assistant at the Kansas Applied Remote Sensing, or KARS, Program, which is part of the Kansas Biological Survey. Working along side John Lomas, the two have been developing greenness maps since 1997 and yield forecasts for eight different crops since 2002.

Greenness maps are created weekly by Lomas from satellite data collected and distributed by the EROS Data Center of the U.S. Geological Survey.

After KARS gathers the data, greenness maps are created, which are posted on its Web site and distributed through TerraMetrics Agriculture Inc., a sister organization to Planalytics Inc., a commercial weather forecasting firm. Planalytics markets the yield projections to commercial entities with a vested interest in agriculture.

Kastens takes the same data and develops biweekly yield estimates based on purely statistical modeling and also passes them on to Planalytics by way of TerraMetrics Ag. “We compare each pixel with a 19-year historical database that reflects past performance,” notes Kastens. “We identify the pixels that best reflect crop performance from past years.”

Pixels representing 240 acres would seem to reduce accuracy, but they actually strengthen the yield-estimating capabilities.

Kastens emphasizes that “the pixels pick up on the surrounding vegetation, providing a climatic signal that enhances our yield-estimating capabilities early in the growing season.” This enables Kastens to develop yield estimates for wheat in late March and corn and soybeans in early June.

**STRIVE FOR ACCURACY**

Data released by TerraMetrics Ag reflects respectable accuracy in the yield estimates. Its winter wheat yield estimates developed in the last week of March came within 2 bushels of the final yield in each of the last five years with fairly good consistency. Its mid-June corn yield estimate matched the final U.S. yield nearly exactly in

---

**Yield forecasting based on analysis of satellite imagery achieves impressive accuracy**
2007 and was within 5 bushels of the final yield in 2002, 2005 and 2006.

The mid-June soybean estimate often is closer than USDA’s August field-survey based estimate and was within 2 bushels of the final published yield in five of the past six years. A dry August in 2003 caused its June estimate to overestimate final yields.

Missing the final yield by 2 bushels in the case of wheat or 5 bushels for corn could have significant implications in today’s marketing environment. However, the trick here is not so much in comparing an early growing season yield with expectations for the final yield, so much as it is comparing it to previous year’s estimates and the final yield in those years. The same can be said for greenness maps, when the real key is comparing current conditions with the “normal” of the past 19 years. Better-than-normal conditions would argue for an above-trend yield, while below-normal conditions would suggest a yield that comes in below-trend levels.

The ability to know a crop’s yield potential early in the growing season would give any farmer a leg up in developing his or her marketing strategy. Evidence of above-normal yields would argue for more aggressive preharvest pricing, while signs of a below-normal yield would suggest a patient approach. The commentary that comes with the estimates would provide additional insight for shaping one’s marketing strategy, with both explained in more depth at Planalytics site at www.planalytics.com.

Knowing the early yield estimates, along with the accompanying commentary, may give you an edge in your marketing, but you can still gain somewhat of an edge over your neighbors by monitoring the greenness maps posted at www.kars.ku.edu each week during the growing season. These maps provide insight into the condition of crops versus the previous week, the previous year and the 19-year average. In this case, having “Big Brother” watching your crops can give you an advantage in strategically marketing them. (1)

Researcher Jude Kastens turns satellite data into crop yield forecasts up to two months before USDA releases its first field-survey based estimate.