Remote Sensing at Helms Farm (Field 5)
Terry Wheeler

Aerial images were obtained with a hyperspectral sensor on June 23, July 9, July 24, and September 2. Aerial color infrared photographs were taken on July 2 and September 8.

Objectives:

1) Determine the earliest time that irrigation treatments impacted the aerial images.
2) Predict yield based on reflectance taken from the aerial images.
3) Compare the value of hyperspectral images to color infrared photographs

Figure 1. Soil classification map based on hyperspectral image from June 23, 2003

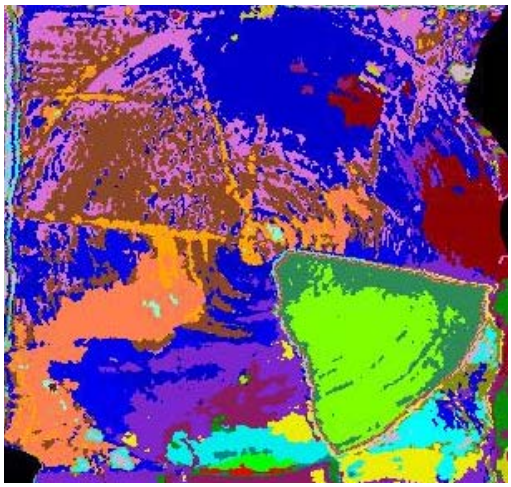
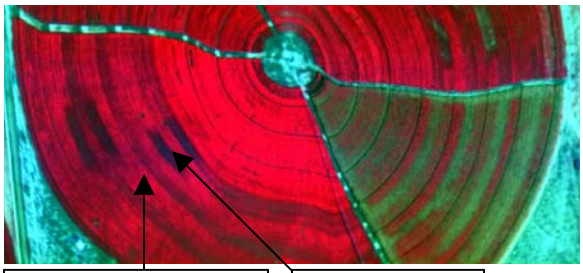


Figure 2. Hyperspectral image on Sept. 2 indicating irrigation treatment differences.



The hyperspectral image taken on June 23 (Fig. 1) after a recent rain clearly shows the soil drainage patterns in the cotton. The green area was planted to corn, which had already grown sufficiently to block the reflectance pattern from the soil. The wettest area of the field was colored coral. Images taken on July 9th did not provide as good information on the soil properties as the earlier image. Images taken on July 24 showed areas that received no irrigation, but didn't differentiate between any other irrigation treatments. Images taken on Sept. 2 (Fig. 2) clearly differentiated the areas receiving no irrigation, and the areas that were 20% less that the base irrigation rate. There was no difference in reflectance between the base irrigation and the base + 20% irrigation rates. Yield were not significantly different between the base (1,470 lbs/a) and base + 20% (1,515 lbs/a) ET treatments, and the base – 20% treatment yielded significantly less (1,179 lbs/acre). So the hyperspectral image taken on Sept. 2 was a good indicator of yield. A model was fitted based on reflectance at 858 nm which is in the near-infrared spectrum where leaves reflect light strongly, and at 630 nm which is in the red spectrum, where soil reflects light more strongly than plants. This model explained 64% of the variation in yield, based on the September 2 image. Both the hyperspectral image and aerial infrared photographs showed soil properties well in late June and early July. The hyperspectral image on Sept. 2 did a better job predicting yield than the infrared photograph taken on Sept. 8.