

## Using Remote Sensing to Detect Weeds and Diseases in a Soybean Field

### Background:

Walking fields to locate weed, disease or insect problems can be very time consuming and, depending on the crop growth stage, difficult to impossible. Therefore, farmers are interested in using remote sensing as a scouting tool. By looking at satellite imagery from their home computers, farmers can identify areas where crops do not appear healthy. The land manager can then visit these sites to determine the cause of the abnormality.

How can remote sensing be used to detect problem areas? Reflectance is influenced by total plant material and plant health. Healthy plants reflect more near infrared and less blue and green radiation than unhealthy plants. Factors that influence plant health are nutrient deficiencies, water stress, disease, and insect damage. Because satellite sensors can measure reflectance in blue, green, red, and near-infrared regions, it is possible to identify areas of stress within a field.

### Use of Data:

IKONOS imagery was obtained on July 17th, 2002 for a farm in southeast South Dakota. A false color image was prepared using IKONOS bands 4 (near infrared), 2 (green) and 1 (blue). The image revealed many problem areas in soybean fields. (Figure 1) In one field, bean leaf beetles and grasshopper damage were detected (Figure 2), while in a second field a waterhemp weed patch was identified (Figure 3). In an adjacent cornfield, strips where nitrogen fertilizer was not applied were observed. Once the extent and locations of the problems were known, counteractive procedures were undertaken.

### Economic and Environmental Benefits:

Numerous insect and weed problems were observed in this field. The imagery assisted the land manager in finding these problem areas in a timely manner. The benefits of using imagery to scout for insect problems include identifying the problem area and applying variable rate insecticide in only these specific areas. The economic advantage to the land manager includes a reduced cost for pesticides, while environmental benefits include reduced levels of pesticides by treating only the affected areas of the field.

Figure 1. IKONOS false color image of the fields.

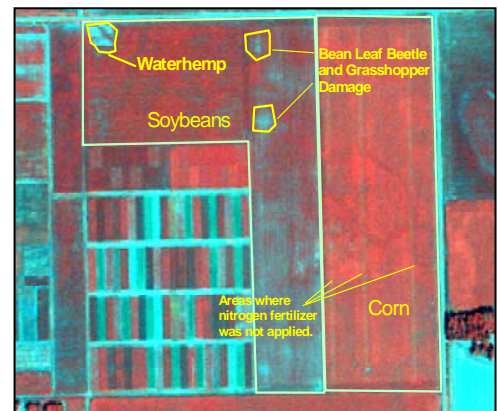


Figure 2. Bean leaf beetle and grasshopper damage in the soybean field.



Figure 3. Waterhemp weed infestation in the soybean field.

**The imagery assisted the land manager in finding these problem areas in a timely manner.**

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