

## Estimating Crop Damage Caused by Inundation (Part I)

### Background:

The 2002 growing season in the Red River Valley of the North was one of the “wettest years in recent history”. From June to August several counties were hit by severe storms provoking devastating floods that heavily damaged crops. During this period the area received 150 to 200 % above normal rainfall, with an intensity of 1 to 3 inches an hour. As an example, Eldred, MN, received 11.36 inches of rain in July, of which 9.53 inches fell on July 9 and 10. The resulting widespread flooding destroyed young sprouts and caused mature crops to turn yellow, suffer from root rot, and die or produce very little. In places where crops were destroyed, replanting was not always possible because the saturated fields took too long to dry-out. In addition, water erosion jeopardized the prospect for late replanting of cash crops.

### Use of Data:

Some producers have developed simple methods using Landsat images where polygons are drawn to delineate the drown-out areas, or images are classified in flooded/non-flooded zones. Afterward, damaged acres are estimated. After receiving



After July 9-10, 2002 storm event: Example of flooded field near Eldred, MN.

the July 29 Landsat image an eastern MN farmer delineated and measured the acres of wheat lost to flooding over one field with excess rainfall. He was able to quickly gather the imagery, measure the acreage, and give his crop insurance adjuster, without delay, a relatively accurate number of acres lost due to flooding. A second eastern MN farmer had several bean fields damaged by water following the heavy July rains. He was able to classify his fields in a series of two clusters (damaged/no damage) as soon as he received the July 29 Landsat image. He then provided his crop insurance company with maps of the potential lost acreage due to flooding to (see figure below). After harvest, the farmer and the crop insurance agent met again. They settled an agreement for financial compensation for abnormally low yields.

### Economic and Environmental Benefits:

Producers were able to observe the crop state and estimate the degree of crop stress and/or potential crop loss two months before harvest. By comparing yield maps and imagery the two parties noticed a strong visual correlation between the low yield areas identified in the yield map and the water damaged zones delineated from imagery. The crop insurance agents were willing to compensate producers for low yield because they received the information of yield loss risk just after the weather event actually happened.

**The crop insurance agents were willing to compensate producers for low yield because they received the information of yield loss risk just after the weather event actually happened.**

