

## 2006 Progress Report

# Using Precision Agriculture Tools to Increase Vineyard Production Efficiency

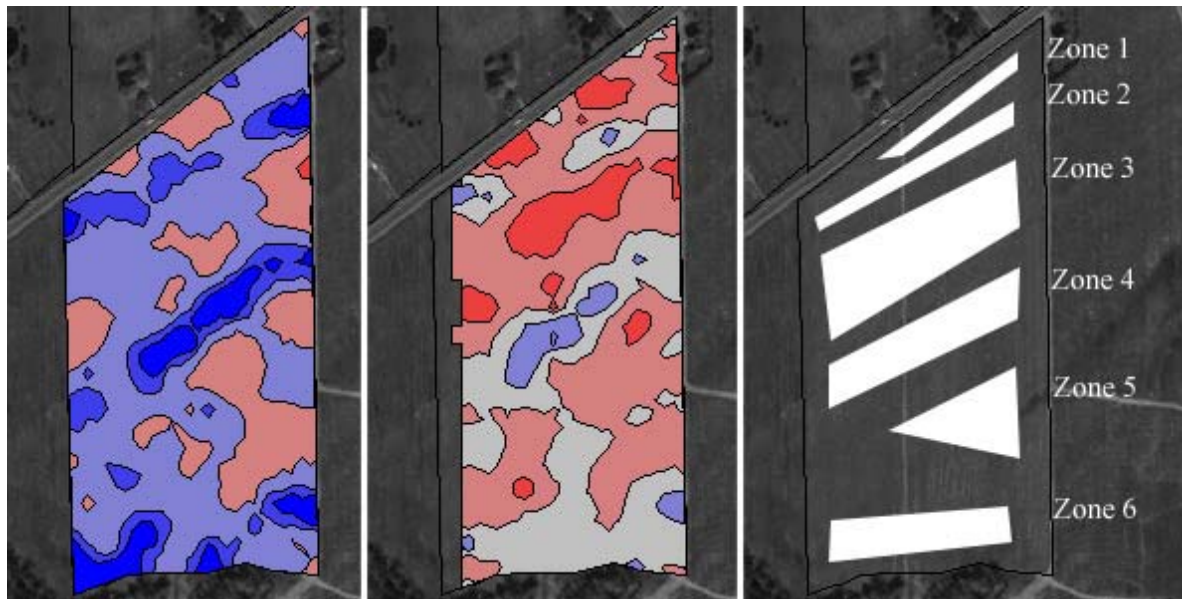
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### Objectives:

- 1) Use precision agriculture technology with ground based vineyard measurements to quantitatively characterize vineyard attributes and identify site-specific environmental limitations to Concord production.
- 2) Create georeferenced management zones in Concord vineyards and measure the effect of differential vineyard management on vineyard productivity, vineyard uniformity, and production costs.
- 3) Develop an educational implementation program for Concord producers to adopt precision agriculture technology, assess vineyard variability, and differentially manage vineyards.

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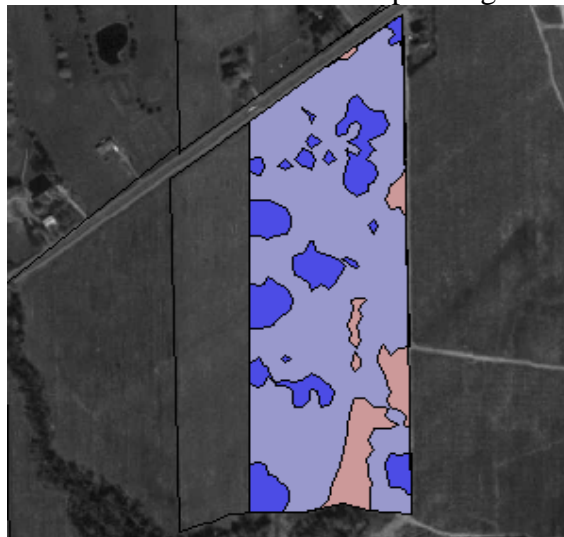


**Figure 1: Betts Vineyard in Westfield, NY.** A 25 acre block with similar gravel-loam soil as the Fredonia Vineyard lab was selected and soil mapped in 2004 and 2005 and six data collection zones were established. The color contour maps indicate volumetric soil moisture (0-20 cm) on 9/3/2004 (left image) and 8/26/2005 (center image). Both images are set to the same color scale ranging from dark red (<5% VSM) to dark blue (>10% VSM). These images clearly show the

difference between above average precipitation in 2004 vs. the below average precipitation in 2005.



**Figure 2:** Further investigations into soil characteristics and root distribution were conducted in the vineyard to help determine differences in vine growth and productivity. Soil trenches were dug and soil samples were collected at four depths. Root systems were then manually excavated. The mature own rooted Concord vines had a relatively shallow and spreading root system. In addition, this gravel-loam vineyard had a pronounced compaction zone in the location of the tractor wheel. The compaction zone was dense and deep enough to restrict the root distribution of the vines. These images are from root trenches corresponding to zone 1 in Figure 1.



**Figure 3: The Future Need for Yield Mapping:** Successful differential and efficient management of Concord vineyards will integrate soil characteristics with vine growth and final harvest yield. Digital measurement of vine size has been successful and automation of this

process looks promising. Yield monitoring is the third component which still needs to be addressed in commercial Concord production. Qualitative visual assessment of yield from riding the harvester and watching the amount of fruit passing over the belt is shown above. However, quantitative measurements are needed to accurately measure yield within blocks. Currently, there is not an acceptable yield monitor commercially available and we will focus on developing a sensing mechanism in the next year.