ABSTRACT

Precision agriculture in practice utilizes GIS far less effectively than it should. My work at a soil consulting company has shown that part of the problem is that the literature does not show an effective way of analyzing soil through GIS that is both scientific and able to be used by those associated with agriculture. The thesis aimed to answer two questions: (1) Are there significant differences between a multiple year composite yield and a single year and if so, are these significant enough to have an impact on normal operations? (2) Are the areas where such differences occur related to slope? Six fields were used for this study: Dob Along G, Emmert, Harstad, Merkt's, Pribnows, and Stefoneks located near New Richmond, Wisconsin. Three years of yield data were used for each field and slope data was created using LiDAR from St. Croix County. These yield data were interpolated using standard industry practices. A single year was compared to composite years to determine what differences, if any, exist between them. Each year and the composite had actual and predicted values compared using the difference of means statistical test to validate the success of the interpolation. A DEM was created from LiDAR and this was used to create a slope map of each field. This slope map was used to divide the yield points by five slope classes: 0 -1°, 1-2°, 2-3°, 3-5°, and >5°. The mean yield and variation was then compared for each class to determine any patterns associated with slope values. The results show that where there is significant variation between single years of yield data the composite will fail. The difference between the composite and a single year is useful in identifying which fields are causing the composite to fail and eliminating them. Slope did not consistently correlate to changes in yield or variation. Dob Along G, Emmert, and Harstad showed no correlation, while Merkt's, Pribnows, and Stefoneks showed decreasing yield and increasing variation as slope increased.