

tant, and soil testing laboratory. Note the fertilizer application charge is annual and represents the additional charge for variable rate application versus use of a single rate applicator.

Costs associated with variable rate P and K applications increase rapidly at grid spacings smaller than 200 feet (**Figure 1**). The costs are easier to accept if they are amortized over a period of four years or longer. We speculate that intense (expensive) grid sampling is required only once if soil test information, fertilizer applications, and crop removals (yield) are geo-referenced so that a nutrient balance budget can be maintained. Additional soil sampling at a later date may be needed in

fields with contrasting soil types (textures) where the general fertilizer response function may not apply equally well to all soil types or to spot check for changes in soil test levels.

One cost not shown is mis-application of fertilizer based on random soil sampling which can lead to an incorrect map of soil test variability. We have observed yield and income losses when soils were classified as not needing additional fertilizer when in fact they were nutrient deficient. Any assessment of the profitability of variable rate fertilizer application must also include an evaluation of the effects of soil test map accuracy. ■

Grid Soil Sampling . . . from page 7

of cells, this time keeping the Y coordinate the same, but changing the X coordinate in each successively lower coarse cell.

- The remaining positions are determined by the X coordinate of the point in the left-hand square of its row and the Y coordinate of the point in the uppermost square of its column.

With this procedure a constant interval both along the rows and down the columns is maintained without alignment. A more complete discussion on sampling and estimation can be found in the reference by R. Webster and M. A. Oliver cited on page 7. ■

Note: Soil sampling for variable rate application is different from soil sampling to determine the field average for a single rate application. Many Extension soil sampling guidelines for field-average recommendations call for dividing fields into smaller areas (five acres according to UW recommendations), but it is recommended that the soil cores within small areas be collected while walking a zigzag pattern across each area. The intent is to obtain a representative soil sample which averages out soil test variability within each small field area. An average or median value is calculated from the multiple soil test results to arrive at a single rate fertilizer application for the field.

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