

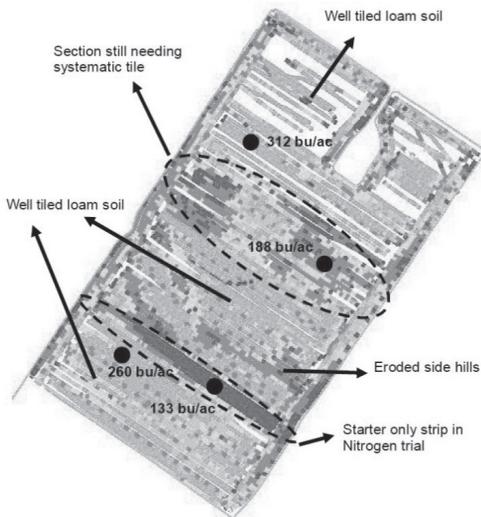


# Variable Rate Debate: Straight Rate vs Variable Rate Applications

by Lynne Warriner, CCA-ON

Often when you are reviewing your soil test results with your Certified Crop Advisor, their recommended actions include variable rate application of fertilizer. Those recommendations often lead to the question: Is variable rate really worth it? I say if your field has variability, yes.

Let's take a look at the corn yield map from my Home Farm last fall and some notes about this field's characteristics to use a reference for the discussion.



The four yield points selected across this field have a 179 bushel range, from the low at 133 bu/ac to the high at 312 bu/ac. The total crop removal rate by corn for Phosphorus (P2O5) is 0.4 lbs/bu and Potassium (K2O) is 0.3 lbs/bu. Therefore, across this field there is a significant difference in the amounts of Phosphorus and Potassium removed in each of the yield zones.

Yield Point	Phosphorus Crop Removal (lbs actual P2O5)	Potassium Crop Removal (lbs actual K2O)
133 bu/ac	53	40
188 bu/ac	75	56
260 bu/ac	104	78
312 bu/ac	125	94

This field variability in yield is very common and can result from many factors including those indicated on the example map: soil characteristics (eroded side hills vs loam),

management practices (starter only strip vs in-season Nitrogen), and abundance or lack of field tile.

If the amount of nutrient removed by each crop is variable it would make sense to variable rate apply the nutrients you replace on that field instead of using a straight rate across a field with variability because a straight rate is only going to exaggerate the nutrient variability over time. With a straight rate application on a variable yielding farm, over time the nutrient levels will fall in the high yielding areas—eventually causing yields to become stagnant or even decrease, and nutrient levels will increase in the low yielding areas where there is not as much removed by the crop, thereby increasing the risk of nutrient loss through erosion or leaching. Along with the potential for negative yield and environmental impacts of straight rate fertilizer applications on variable farms, there is also the monetary risk of spending too much on fertilizer in the low productivity zones or not applying enough fertilizer to high productivity zones not reaching the yield potential of those areas.

## The debate then moves to the capabilities of the application equipment

Yes, there is still a long way to go to have field scale equipment that is able to variable rate spread fertilizer in less than 40 to 60 foot boom widths and have rate transitions occur instantaneously instead of taking a few seconds and 100 feet to change the rate. But given the huge advances in machinery automation in the last 5 years, I truly believe that these equipment shortcomings will be overcome in the not too distant future.

## The variable rate debate comes down to making a decision on each farm: straight rate or variable rate?

Based on each farm's characteristics, you must weigh the risk of applying a single rate and not applying enough in the high yielding areas and too much in the low yielding areas vs variable rate applying and the equipment limitations resulting in over or under application in transition zones.

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There are over 500 Certified Crop Advisers (CCA) in Ontario. Each CCA has demonstrated their knowledge about Ontario crop production by passing the required exams. In addition, they have the crop advisory experience, the education, the commitment to continuing education and have signed a comprehensive code of ethics, which places the grower's interests first.

This industry driven program helps ensure that Ontario crop producers are well served by those providing their crop production advice. This article was written by one of those CCA's.