



# Understanding Available Data and Layers in Digital or Prescription-Based Agriculture

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**P**recision agriculture can be an enabler for 4R nutrient management, on-farm trialing, and margin management. The purpose of this article is to provide some clarity on the terminology and various layers used to develop recommendations and actionable outcomes.

**Remote Sensing:** NDVI-Normalized Difference Vegetation Index is useful for quantifying the amount of green vegetation in a given area. The range in values is -1 (water), -0.1 to 0.1 (bare soil) to +1 for temperate and tropic rainforest. Ground proofing or another data layer is required to quantify the differences.

**RGB**-short form for Red, Green, and Blue, is the same type of picture that could be taken with a camera or phone. However, this is a georeferenced image of your field taken by satellite or drone, that can be used for management decisions.

**Bare ground imagery**-A geo-referenced RGB image of the field without crop. Can be used to identify management zones or areas of interest.

**Crop/Plant Health**-A geo-referenced image of crop development at a given point in the season, typically built off satellite imagery with proprietary analytics to develop the map/scale.

**Soil Based:** Electric Conductivity (EC)-a measurement of the electric conductivity of the soil. Measurements are typically developed using an EM38 or Veris unit. Useful in defining soil textures, areas of nutrient accumulation and salinity.

**Organic Matter (OM)**-Several options have the capability to measure OM changes throughout the field using a ground-engaging optical sensor.

**Soil Tests**-Most have experience with standard soil tests, with prescription based agriculture the question is how you assign it to an area. Typically, a zone is developed first (grid, or based upon another parameter), then samples are pulled from those zones to provide a result for site specific recommendations.

**Spatial:** Grid-is a management zone based upon a set square size. Typically, it is based in one (0.4 Ha) or 2.4 (1 Ha) acre grids. Other popular sizes are five or 10 acres. Typically used for fertility management.

**Zone**-refers to a geo-referenced area. It can be any size and is usually based on another data layer. Grids are one type of zone, other examples that could generate zones include; yield, bare ground, NDVI, etc. A zone is required to generate a prescription.

**Composite**-usually is in reference to a soil sample made up of 15 to 25 cores. A grower using composite soil sampling typically has one composite soil sample per 25 acres. This area may or may not be a geo-referenced zone.

**Learning, Smart or Test Blocks**-are checks or tests

placed within a management zone to evaluate the underlying methodology and prescription writing. This could include A/B testing, where a prescription is turned on and off over the field, to evaluate a given input - i.e. a fungicide application.

**Prescription**-the final digital file that directs the machine rate controller how much material to apply, or how to adjust the machine, at a given location in the field.

**RTK**-Real-time kinematic-A corrected GPS signal that can be used to provide elevation data. The data can be from any type of field pass, provided the monitor is using a RTK signal.

**LiDAR**-is short form for *light detection and ranging*. Using a laser, this can be a source of elevation data, which is useful for topography modelling.

**Elevation**-a geo-referenced point in the field above sea-level, usually expressed in feet.

**Topography**-a configuration of the surface of a field, including its relief and the position of its natural and man-made features.

**Yield:** Yield-Data from harvesting equipment. This can be affected by header width, equipment speed and volume/test weight/moisture. It can be a difficult layer to work with long term as it is only one data point, but, affected by many factors. Only static yield layers (no VR applications in the field) should be used for creating management zones. Good for making crop removal P&K recommendations, profitability mapping, and finding areas of interest.

**Financial:** Profitability map-A very simple, but effective map. In its simplest form, it is gross revenue (yield X average selling price) - input costs = profit. Useful for determine profitable and unprofitable areas of the field/farm. Can be further used to conduct additional analysis on why an area is unprofitable (provides no return on inputs), and if any adjustments can be made to improve profitability.

**Seven questions to ask to get started:**

- 1) What do I want to manage, measure, or learn more about?
- 2) What are you currently doing/using today to create agronomic recommendations?
- 3) What available data and equipment do you have to generate and apply the recommendations?
- 4) Which inputs could be varied that would have the biggest impact or are influenced by field/farm variability?
- 5) What resources do I have or require for creating the plan and executing on it? **Additionally;**
- 6) Do you have a systematic approach to organizing, sorting and selecting the data and creating recommendations?
- 7) How do you back up your data in the event of a service provider change or equipment failure?

**References:** NDVI – Sentinel Hub (<https://www.sentinel-hub.com/eopproducts/ndvi-normalized-difference-vegetation-index>) – Accessed February 27, 2019; Grain Farmers of Ontario – Understanding Precision Agriculture - <https://ontariograinfarmer.ca/tag/understanding-precision-agriculture/> - Accessed September 2018

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