



Importance of Knowing Yield

Introduction

Crop yield data can be collected at various scales, including the whole-farm, field, and within-field. Truck and farm scales can be used to determine yield-per-farm, yield-per-field, or a plot within a field. Yield monitors typically provide georeferenced yield information every 1-3 seconds during harvest, which results in yield maps that show variation in yield at the within-field level (Figure 1). While it takes time and effort to collect yield data, there are benefits of knowing yield. This factsheet identifies ten reasons why investing in yield data collection is worthwhile.



Figure 1: Yield data can be collected with truck scales (left), farm scales (not shown) or harvesting equipment with yield monitor technology (right).

1. Yield Inventory Tracking

Yield inventory tracking at the whole-farm level, or per crop produced on the farm, allows for (1) allocation of the harvested home-grown crop to minimize feed purchase needs for dairy and livestock farms, and (2) better informed crop sale decisions (such as determination of amounts, timing of sales and pricing) for farms that sell crops. Additionally, a comparison between grain or silage in storage and the amount harvested can help quantify storage loss. Knowing storage losses can help determine if management changes are needed to protect future harvests.

2. Whole-Farm Nutrient Mass Balances

Whole-farm nutrient mass balances are determined by subtracting nutrients exported

as milk, crops, manure, and animals from nutrients imported onto the farm in feed, fertilizer, animal purchases, and bedding. Information on yield-per-crop per year allows for assessment of whole-farm nutrient use efficiency and diagnostics for both field and herd management. Dairy farms in New York that have improved their whole-farm nutrient mass balance over time have mostly done so by increasing home-grown forage production and through better alignment of feed and fertilizer imports with herd and crop nutrient needs. This can help improve farm economics and reduce the farm's environmental footprint.

3. Return on Investment

Yield information is needed to determine a return on investment for crop and other inputs including fertilizer, seed, and crop protectants. Knowing return on investment for a crop at the whole-farm or field level can help a farm identify what crops to grow and where, or where not, to invest in crop inputs (e.g., higher seed rates, higher fertilizer applications). Tracking yield typically increases the value of the farm to potential buyers and renters as well because yield and return on investment information can be used to determine if the purchase or rental is worthwhile.

4. Trends Throughout Years

Determining yield trends over time at whole-farm and field levels will help assess the impact of changes in management on production and farm profitability. Yield trends can guide management decisions and help highlight year-to-year variability in yield. Given the large impact of weather-related variability, it is important to accumulate at least three or more years of yield information to have enough history to create accurate trends.

5. Match Crops with Soils

Not all soils are equally suited for all crops and growing conditions. Yield information will help identify which crops or cultivars best match the soil resources so that a farm can reach crop yield potential (expected yield of the crop) and

determine yield gaps (the difference between yield potential and observed yield).

6. Crop Rotations

Knowing yield for crops in a rotation can guide decisions on rotation selection (which crops) and timing of the transition from one crop to another for higher yields and improved soil conservation across the rotation.

7. Determine Field Nutrient Balances

Yield and crop nutrient application and nutrient uptake information are essential for developing nutrient balances at the field and within-field level (nutrients removed versus nutrient supplied). Knowledge about field balances will help identify fields and within-field areas where nutrient applications can be reduced without impacting crop yield or increased to obtain higher yields more efficiently.

8. Troubleshoot for Low Yield

Yield information may help identify problematic areas at the whole field and within-field levels. Having the capacity to identify the fields on a farm (or sections within a field) with low yields allows for targeted investigation of barriers to higher yield. Such barriers could then be evaluated through targeted soil testing and tissue testing to see if specific nutrients are limiting or available in excessive amounts, or the soil pH is too low for the crop.

9. Variable Rate Management

Spatially determined yield information (a yield map) is essential to evaluate if variable rate management (applying inputs in differing quantities depending on crop needs and soil supply) is likely to increase crop yield or reduce cost of production. In return, knowledge of expected yield and yield variability over time is essential for variable rate nutrient prescriptions. Any time when crop needs and nutrient supply can be better aligned, it will improve farm profitability. Variable rate management may also reduce labor and/or costs of inputs by focusing management on specific areas in a field, such as lime application where pH is low and not on other parts of a field.

10. On-Farm Tests

Farms benefit from conducting tests on their own farm, as the findings will be relevant to the farm's soils, management, and growing conditions. Being able to evaluate the impact of

a management change on yield requires comparing at least one treatment or rate to another (plots with different fertilizer rates, seed populations, etc.) and the ability to measure yield per plot, which can be done with farm scales. The use of well-calibrated yield monitors greatly enhances on-farm testing opportunities as yield data are collected on the go without delays typically involved with use of farm scales.

General Summary

Yield information can be collected at different levels and used for a range of management practices. While yield assessment can require an investment of time and money, there are many benefits to knowing yield at the farm level, the field level, and the within-field level. As economic pressure and environmental expectations continue to evolve, tracking yield, especially within-field will be increasingly needed for optimal management.

Additional Resources

- How and Why to Clean Corn Yield Monitor Data. 2019. Cornell University. Nutrient Management Spear Program (NMSP). <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet107.pdf>
- On-Farm Research. 2012. Cornell University. Nutrient Management Spear Program (NMSP). <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet107.pdf>
- Measuring Corn Silage Yield. 2013. Cornell University. Nutrient Management Spear Program (NMSP). <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet71.pdf>

Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of discharge levels from agricultural land.

For more information



Cornell University
Cooperative Extension

Nutrient Management Spear Program
<http://nmsp.cals.cornell.edu>

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