

# **UTILIZING GPS YIELD MONITOR DATA TO INCREASE PROFITS**

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## **Introduction**

Farming operations must become more profitable per acre to survive times like these. The profitable farming operations have been surveyed and they have revealed that lower costs, higher yields per acre, and the attention to detail does reward management. Screening yield monitor data for trends is often a detail overlooked. This data has a wealth of knowledge if we better utilize this new technology. This paper will step through one aspect of how to manage data that is often regarded as a useless tool to production agriculture.

Most producers know areas within a field are costing them significantly more than they are returning. These areas often times could be better managed by proper drainage, adding lime, or perhaps taking areas out of production in extreme situations. A return on investment map provides the producer evidence that improvements need to be implemented. The time period these improvements can be paid for can also be estimated from the maps. The recent technology leaps in geographical information systems, (GIS) have allowed producers, consultants, and university professionals the opportunity to observe how the specific areas within a field perform financially. It all starts with acquiring quality yield monitor data on the best and worst fields we farm.

## **Converting Yield Data into Return on Investment Data**

Quality return on investment maps begin with collecting accurate yield data in the field. Thus, spending time calibrating and ensuring the data collected is accurate, is an important detail often overlooked. For proper calibration and settings, a producer should consult the yield monitor manual for accuracy.

After collecting accurate yield data in the field, it should be transferred to our personal computer in the comfort of our office or homes for further analysis. The first step is to convert the yield data into dry bushels for each point collected. The procedure is frequently an option within each mapping program. The producer should consult the yield monitor manual for proper conversion requirements and steps. Following the conversion of the yield data into dry bushels, the table of the data needs to be modified further to produce return on investment maps. The table for each field recorded should contain the following information: longitude, latitude, field name, load, variety name, moisture, wet yield, and dry bushels for each point collected. The table at this point needs to be brought into a spread sheet or a GIS program. The dry bushel point column will be multiplied by crop price per bushel to give gross return per point. The average input cost of the crop

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will then be subtracted from the gross revenue to give a net revenue per data point. The following is an example of the formula applied:  $175 \text{ Bu corn} \times \$2.08 \text{ corn / Bu} = \$364.00$  gross revenue -  $\$252.61^3$  input cost / acre =  $\$111.39$  net revenue per data point. The data can then be converted into the proper file extension for display in the mapping program. The software or mapping program is now utilized once again for displaying and analyzing return on investment column created from the formula. Some producers will elect to view (classify) the data into natural breaks with 4 to 6 different classification categories. This classification method allows all the data to be viewed simultaneously. Viewing all the data (positive and negative) returns together is often confusing and provides little insight to the viewer of how much of an area is being influenced by a product or environmental factor. Increasing the number of classification breaks and associating them with a specific color, also confuses the viewer. The confusion of these options stem from our inability to separate colors and observe trends within a field. A much clearer perspective is gained if the classification is broken down into either twenty-five or fifty dollar increments of negative or positive return only within the field. For example, the classification with color scheme for a negative dollar return (not covering input costs) in a field would be neg. 250 - 200-black; neg. 199 - 150-dark-red; neg. 149 - 100-light-red; neg. 99 - 50-dark-blue; neg. 49 - 25-light-blue; 24 - 0-dark-gray. If a seventh classification category is desired, perhaps light green for positive 1 - 25 dollars can be considered, to illustrate areas within a field that are marginally providing profit. The same classification method can then be used for the positive return portion of the field.

For producers that have more than one season of yield data, it may be important for the producer to show the long term financial status of a field. The data from the two or more season can be merged together and averaged. This data could then be converted to a return on investment map to illustrate long term trends. For example, a grower has soybean yield monitor data for 1997 and corn yield monitor data for 1998. The data would be handled the same and converted into dry yield. This data would then be used to create a surface using interpolation methods (krigging or inverse distance) like those used for fertility maps within certain GIS programs. The two years could then be merged together so dry yield for soybeans in 1997 would be associated with corn dry yield from 1998. The soybean dry yield column could then be multiplied by soybean price in 1997 and subtracted by the average input price per acre<sup>4</sup>. The corn column could then be treated the same way as the soybean column. These two columns could be added together and divided by two to give an average for the two years of revenue. This approach will

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<sup>3</sup> Average Production Costs and Returns of PEPS Contests For Corn Production in Wisconsin 1998: Seed: \$33.66, Fertilizer: \$56.40, Chemical: \$23.67, Other: \$5.43, Custom: \$6.79, Drying: \$14.97, Interest: \$7.17, Variable Equipment: \$18.34, Fixed Equipment: \$22.11, Land: \$64.07, Cost / Acre: \$252.61, Average Corn Price: \$2.08.

<sup>4</sup> Average Production Costs and Returns of PEPS Contests For Soybean Production in Wisconsin 1998. Seed: \$28.00, Fertilizer: \$24.67, Chemical: \$23.67, Other: \$5.43, Custom: \$6.79, Drying: \$14.97, Interest: \$7.17, Variable Equipment: \$18.34, Fixed Equipment: \$22.11, Land: \$64.07, Cost / Acre: \$252.61, Average Soybean Price: \$5.65.

provide the producer and landowner a firm trend of how a field or area is performing over several seasons.

## **Discussion**

Many questions arise when yield maps are converted into return on investment maps, especially when negative returns appear within a field. In many cases, negative returns are often associated with water surplus or deficiencies. In the case of water surplus, a producer could utilize the information to communicate and justify tilling to a landowner by comparing profitability surrounding the area. However, in some situations organic matter (O.M.) is extremely low, or perhaps a rock base or sand ridge exists beneath the soil surface that inhibits water retention. Since water retention and availability are difficult to change over short time periods, alternative options may need to be exercised. Negative returns in an area within a field may need to be taken out of production and planted into grass, trees, or shrubs. If qualifications are met, the areas could fall into government programs like conservation reserve programs (CRP) and others. This would provide a landowner profit in an area while building up organic matter and reducing pesticide load in a non-profitable area.