What Will This Investment Cost?

Tim Stombaugh, Biosystems and Agricultural Engineering , Carl Dillon, Agricultural Economics, Scott Shearer, Biosystems and Agricultural Engineering

One of the primary hindrances to the adoption of precision agriculture management strategies has been the cost of the technology. You should know, however, that it is possible to recover the cost of your investment. This publication attempts to address part of the profitability equation by outlining the initial investment costs, or capital outlay, associated with precision agriculture technology. Be aware that this publication does not fully address the annualized expenses of equipment and software ownership. Some trade names are mentioned to help bring clarity, not to serve as endorsements, and you should explore all options before purchasing items or services.

Software

One of the inherent side effects of using precision agriculture is that you collect huge amounts of data. A software package is imperative to help manage that data. Software packages come in a wide range of prices and have varied capabilities. The simplest packages (e.g., JD Map, Manifold GIS) can be obtained for $400 or less. These packages will give you the ability to overlay and manage multiple data layers, as well as create maps. Keep in mind that some are not tailored to precision agriculture, and some have limited capabilities for performing analyses.

The midrange software packages (e.g., Farmworks, SMS Basic, MapCalc) run from $500 to $1,000 and give you more capabilities for importing data sets and performing basic analyses. Some will even have field data collection and variable rate application (VRA) capabilities.

The highest-end packages (e.g., ArcView, SSToolbox) could cost several thousand dollars. These packages offer the most analysis and management capabilities and are often targeted to dealers or service providers.

Purchase agreements for some software packages provide technical support and software upgrades; however, other suppliers require an annual fee of several hundred dollars for these services. Producers who opt out of the service contracts may end up paying a hefty price to upgrade software, so budget accordingly.

Computer

Most producers who are considering precision agriculture technology already use a desktop personal computer for record keeping and management. Unfortunately, the spatial data sets collected using precision agriculture can become very large very quickly. Be sure your computer has ample memory and backup capability for your farm database, as well as for the software package you choose. If you need a new computer, expect to pay at least $1,500 to $2,000. Because of the rapid obsolescence of personal computer technology, you should budget to replace your computer every three years.

GPS

Global Positioning System (GPS) technology has changed rapidly during the last several years, and it will likely continue to change. The general trend has been for GPS accuracy to increase, while costs decrease. Currently, it is possible to purchase handheld GPS receivers with WAAS correction for under $300. They are sufficient for some basic precision agriculture activities, including soil sampling and yield monitoring, but not for more precise operations, such as VRA and lightbar guidance. The more precise receivers will cost from $2,500 to $4,000. Be aware that some receiver configurations may require an annual subscription fee that costs up to $800. The useful life of most GPS receivers should be about five years.

Mapping and Sampling

Many service providers will map fields and do grid sampling for about $1 per acre for mapping and $6 per acre for grid sampling (2.5 acre grid). If you have your own GPS receiver and a laptop or palmtop computer, many basic precision agriculture software packages will allow you to map fields, lay out grid sampling zones within a field, and navigate to sampling points. As you budget, make sure you account for the increased amount of labor required to sample the soil and for the increased number of sample analyses. You may also want to budget about $5,000 for an all-terrain or similar vehicle to use for sampling activities.

Yield Monitors

Yield monitors can either be purchased as an option on new combines or as an aftermarket addition to an existing combine. Most yield monitors (without GPS receivers) will cost approximately $3,500 to $4,000. Yield monitors should last at least five to eight years, and users should expect few recurring costs unless cables or components are somehow damaged. Check carefully with each manufacturer to determine which additional software and/or hardware purchases may be required to transfer data from the yield monitor to a computer to create maps.

Variable Rate Application

More input providers are offering VRA capabilities. Most applicators will charge $7 to $12 per acre for VRA of one product, which is about $2 to $3 over traditional field average application. To obtain VRA capabilities on your own application equipment, you will need to add three devices: 1) a mobile processor; 2) a rate controller; and 3) an actuator.

The mobile processor could be a laptop computer, palmtop computer, specialized rugged computer, or even the processor used in yield monitoring systems. It receives a GPS signal and determines the rate that should be applied, based on the GPS coordinates and the application map that the user loads into it. The mobile processor then sends a rate command to the rate controller, which is another electronic box that translates the application rate and ground speed information into the proper control signal for the actuator. The actuator is the device that changes and controls the application rate. On spinner spreaders, the actuator is usually a hydraulic motor and control valve that varies the speed of the apron chain. On liquid equipment, it could be a variable speed-injection pump or a hydraulic drive on the main pump.

Several manufacturers offer dedicated VRA controllers and actuators costing from $3,000 to $5,000. With the proper software, a laptop or palmtop computer can be used as a VRA controller, and some yield monitors can double as VRA controllers, thus reducing your overall costs. The actuator is usually unique to a specific machine and cannot be easily moved to other equipment. Expect to pay an additional $2,000 to $4,000 for actuator components. VRA hardware should have a useful life of at least eight years.

Conclusion

There are many interrelated components of a precision agriculture system. These, in turn, have different investment costs that need to be justified. To make the wisest decisions, potential users must carefully consider the economic impact of each component. Precision agriculture is a fast-developing technology experiencing continually changing prices. Economic analysis should be based on updated prices, such as those available at <http://www.precisionag.com>.

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