Precision Guidance Systems: Is now the right time?

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Recently, the 9th International Conference on Precision Agriculture (ICPA) culminated in Denver, Colorado. The ICPA conference is the largest gathering of Precision Agricultural scientists and practitioners from around the world. One of the keynote speakers at the inaugural plenary session of the ICPA conference, Dr. Simon Blackmore, talked about the "Robotics in Agriculture". Dr. Blackmore is an international authority in the area of Precision Technologies and is currently the Project Manager of the European Union's Future Farm project. In his talk, he presented numerous video-examples of robotic applications in agriculture and their various stages of development. While the thought of "robotics in agriculture" sounds Utopian, Dr. Blackmore's presentation over and again suggested otherwise. Robots will be on farm probably sooner than we would imagine (Figure 1).

Figure 1. Visualisation of seeding robots. [Adapted from Blackmore et al., 2008]

Not too long ago, people around the world felt the same for site-specific farming and precision agricultural technologies. Some of the initial thoughts were, that it would be "expensive", "not-practical", "will not work or pay for itself", etc. Today it is a reality. The 13th annual Precision Agricultural Survey[1] conducted by CropLife Media Group and Purdue University that came out earlier this year (Questionnaires were sent to 2500 retail agronomy dealers across the US) indicates "GPS Guidance with Manual Control/Lightbar" was used by 73% of the respondents "GPS Guidance with Auto Control/Auto Steer" use was at 37% (Figure 2). Adoption of precision guidance technologies are at an all time high, since they first came out in 1990s.

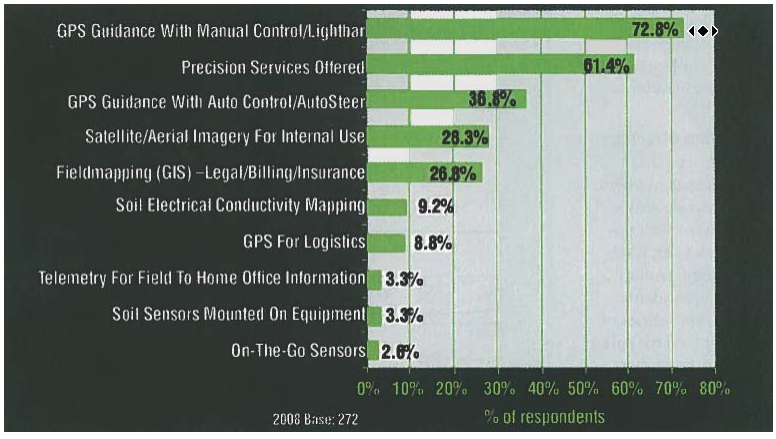

Figure 2. Use of GPS Guidance is at all time high

[1] See the complete copy of the survey at https://www.agecon.purdue.edu/cab/research_articles/results.asp?cat=CropLifeSurvey

What are these Precision guidance systems? Precision Guidance system refers to the activity of operating farm equipment (tractors, combines, etc) with the aid of a positioning system such as Global Positioning System (GPS). There are primarily two types of guidance systems: (i) a farmer is actually the driving the tractor and he is aided with a sensor or suite of sensors to maintain his driving pattern referred to as "Manual Control/Lightbar" and (ii) a farmer is primarily supervising the tractor in its "auto-steer" or "hands-free" mode referred to as fully auto-mated "Auto Control/Auto Steer" system.

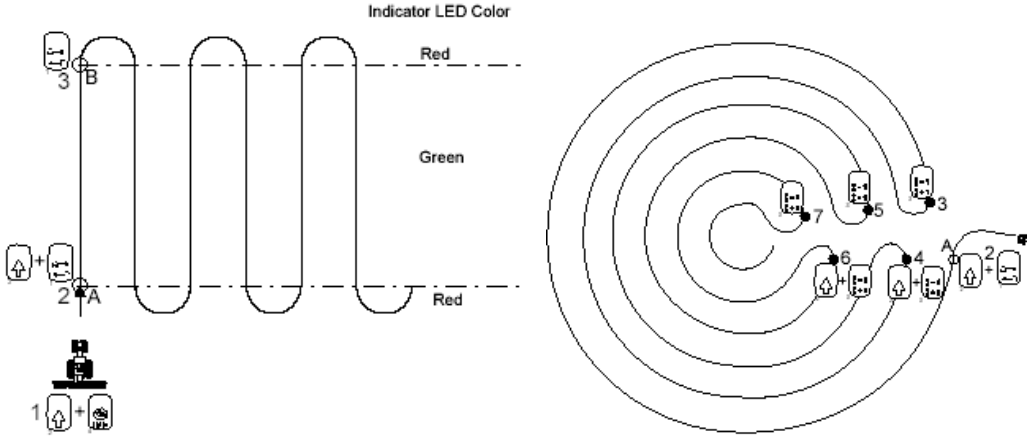

Figure 3. A Schematic showing a parallel swath of operation on a rectangular field and a circular center pivot irrigated field using a precision guidance system.

Either system has numerous economic, agronomic, and personnel advantages. These include, but are not limited to:

(i) Reduction in stress and fatigue making it a safer and more productive operation
(ii) Less over-laps or gaps when applying fertilizer or spraying pesticides
(iii) Cover more acres in less time, there is about a 10 percent advantage in the speed of operation compared to manually operated systems
(iv) Can be operated for longer hours when needed, such as at the time of planting or harvesting. Night time machinery operation is feasible and is as accurate as daytime.
(v) Does not require a skilled person behind the wheels (a novice can drive an auto-steer system just as good as a skilled operator)
(vi) Can be operated day or night, hence a farmer can spray herbicide at night when the winds are calm, or on a foggy day, or driving against the setting-sun, without compromising agronomic accuracy or safety.
(vii) Additional savings with no need to purchase foam markers or row-markers
(viii) Allows precision cultivation and tillage operations such as tilling ground with drip tapes, or installation of drip tapes for drip irrigation system
(ix) Additional advantages include, precision mapping and levelling, etc.

So how much does it cost? Well the cost of the system varies greatly like with most products/equipment in agricultural market. It depends on which particular system you want to

purchase and what components would you need to get started. There are over a dozen guidance systems on the market. The price of these guidance systems has significantly come down in the last three years and may range anywhere from $3,000 to $15,000, with a very dependable system costing somewhere around $8,000. A quick "back-of-the-envelope" math indicates that in Colorado, where the average farm size is about 990 acres (CASS 2008), purchase of a guidance system would translate into a cost of slightly over $8/acre. While that would be a significant investment, advantages, agronomic, economic and personal are numerous. Like one farmers said it all "*My guidance system paid off in one year simply by relieving stress*" (Reeder, 2002).

Precision Guidance Systems are a sound investment for your farm. We are going through resurgence in agriculture when crops are expected to be grown not only for food, feed and fiber but also for "biofuel" purposes. Now may be an appropriate time to consider looking into a guidance system suitable for your operation.

Figure 4. A Lightbar for Semi-Auto Guidance System

For more information please contact Dr. Raj Khosla via email: raj.khosla@colostate.edu.

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