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Farmers' Use of Yield Monitors

Terry Griffin
Assistant Professor - Economics

Instantaneous yield monitors have been commercially available since the 1990s, first in grain harvesters and later in cotton pickers. This fact sheet summarizes data regarding how farmers have made use of yield monitors in conjunction with and without global positioning systems (GPS). Estimates are based on United States Department of Agriculture – Agricultural Resource Management Survey (USDA ARMS) data. The USDA-ARMS survey provides the most detailed information with respect to precision agriculture adoption and use in the U.S. The survey is a collaborative effort by the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS). Since 1996, the ARMS Survey has provided information on production practices and resource use of America's farmers through face-to-face interviews. This fact sheet reports results from 2002 through 2005.

Beginning in 2002, eight questions related to how farmers use yield monitor data were asked on the ARMS survey. Soybean was the crop examined by the 2002 ARMS survey. In 2003, cotton, sorghum and barley were examined. In 2004, spring wheat, winter wheat and durum wheat were the focus of the ARMS survey. Corn and oats were examined by the 2005 ARMS survey. Table 1 presents information for all nine crops, with the crops relevant to Arkansas presented in the first half of the table and in Figures 1 through 5.

Monitor Crop Moisture

The leading use of yield monitors by farmers has been to monitor crop moisture. Anecdotal evidence suggests that farmers use the moisture sensor to determine if the crop is ready to be harvested and/or to decide which drying or storage facility to send the particular crop to. Although the moisture sensor on yield monitors was initially intended to accompany the mass flow sensor to correct for moisture when calculating yields, the moisture reading on its own has been the most commonly used data from the technology.

Document Yields

Documenting yields is the second most common use of yield monitors and the original intent of the technology. Although these data suggest that yield documentation has not been a primary use of the technology with landowners in negotiations or splitting crop shares, yield documentation in general remains the second greatest use. The remaining questions regarding uses of yield monitor data give more detail into how documenting yields has been used by farmers.

Conduct Field Experiments

Yield monitors and other site-specific sensors have allowed farmers to collect many low-cost yield observations. Farmers have used this information to compare crop varieties, tillage treatments and other inputs or systems. For the crops reported in this fact sheet, using yield monitors to conduct field experiments ranked as the third or fourth greatest use. For cotton pickers equipped with GPS, conducting field experiments was the greatest use of the technology.

Table 1. Use of Yield Monitor Data for Selected Crop Farms With and Without a GPS Unit, 2002-2005.

	Soybean (2002)		Cotton (2003)		Sorghum (2003)		Winter Wheat (2004)		Corn (2005)	
With GPS?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Monitor crop moisture	68	86	*	*	63	58	60	85	91	83
Document yields	50	40	25	41	24	52	41	29	51	30
Conduct field experiments	42	23	37	*	21	5	14	9	46	28
Tile drainage	32	8	5	3	3	*	32	2	31	7
Negotiate new crop lease	9	1	1	3	*	*	*	1	5	2
Divide crop production	6	7	7	54	*	16	7	8	12	11
Irrigation	4	*	4	8	*	*	*	*	4	3
Other uses	7	13	1	19	*	4	*	7	7	5

	Barley (2003)		Durum Wheat (2004)		Spring Wheat (2004)		Oats (2005)	
With GPS?	Yes	No	Yes	No	Yes	No	Yes	No
Monitor crop moisture	68	67	100	52	60	63	99	66
Document yields	76	38	69	65	54	37	8	18
Conduct field experiments	32	5	*	13	53	9	44	1
Tile drainage	6	6	*	*	7	**	*	1
Negotiate new crop lease	5	*	53	*	21	*	38	*
Divide crop production	12	11	*	48	*	3	*	*
Irrigation	24	3	*	*	*	*	*	*
Other uses	15	8	53	*	6	20	39	36

*Less than 1 percent

Tile Drainage

In areas of the U.S. that rely upon subterranean tile to drain soils, anecdotal evidence has suggested that yield monitors equipped with GPS have helped to quantify the yield reduction due to poor drainage and the potential benefit from drainage improvements. The quantification of yield and profit losses due to poor drainage can be a factor in making land improvements where the farmer owns or leases the land. The ARMS data supports the notion that farmers are using yield monitors with GPS to make tile drainage decisions, especially for soybeans, winter wheat and corn, with over 30% of farms with a GPS yield monitor.

Irrigation

Except for barley, making irrigation decisions based on yield monitor data has not been a common use of the technology, with less than 10% of farms stating that they have made irrigation decisions based on the technology.

Negotiate New Crop Lease and Divide Crop Production

With the exception of cotton, farmers have not used yield monitors in lease negotiations or splitting crop shares. Early in the use of yield monitors, it was expected that leasing arrangements would benefit from the technology; however, from this data and anecdotal evidence, farmland lease arrangements have not been greatly influenced by precision technology especially for negotiating the lease. Farmers producing cotton, durum wheat and sorghum have made at least some use of the technology for splitting crop shares.

Bottom-Line Considerations

Farmers are using precision agriculture technology to produce crops, manage resources and in their farm management decision-making process. Farmers have often made productive use of technology in ways that the manufacturer may not have foreseen. Farmers consistently answered “other uses” in response to how they made use of yield monitors on the ARMS survey, suggesting that they are making use of yield monitor data in ways that did not fit well into the existing categories.

Farmers’ use of yield monitor data differed by whether it was associated with GPS or not, suggesting that the site-specific information combined with the yield data allows for additional farm management decisions. When the yield data has a location attribute, farmers were able to use their data to conduct field experiments and determine impact of tile drainage.

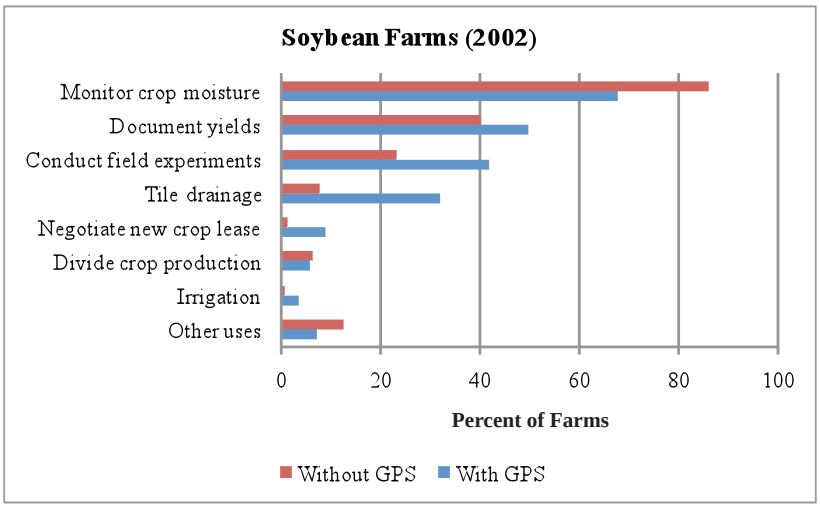

Figure 1. Use of Yield Monitor Data for Soybean Farms With and Without a GPS Unit, 2002.

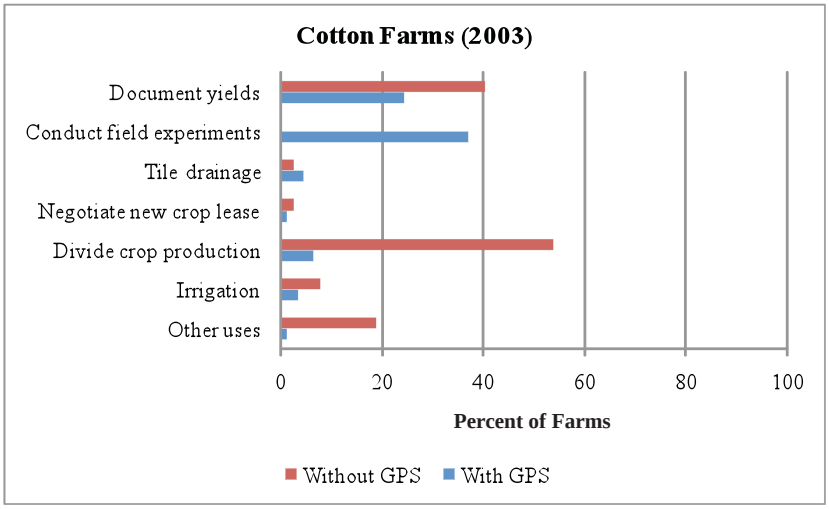

Figure 2. Use of Yield Monitor Data for Cotton Farms With and Without a GPS Unit, 2003.

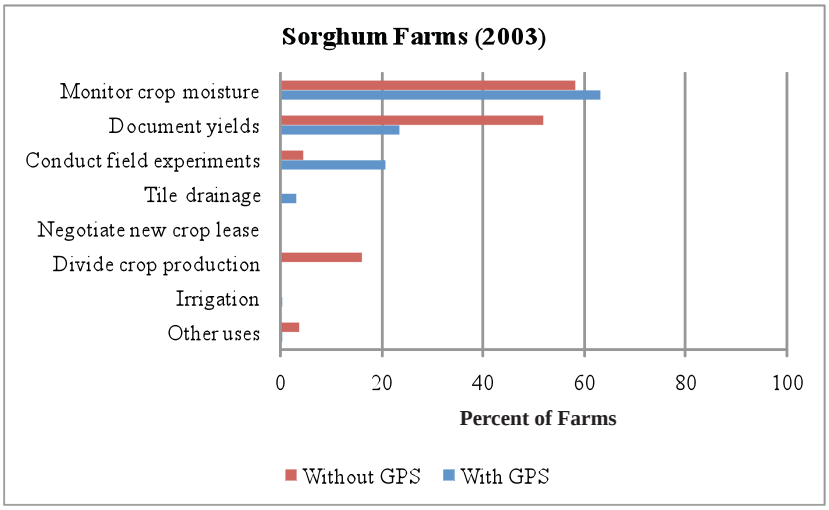

Figure 3. Use of Yield Monitor Data for Sorghum Farms With and Without a GPS Unit, 2003.

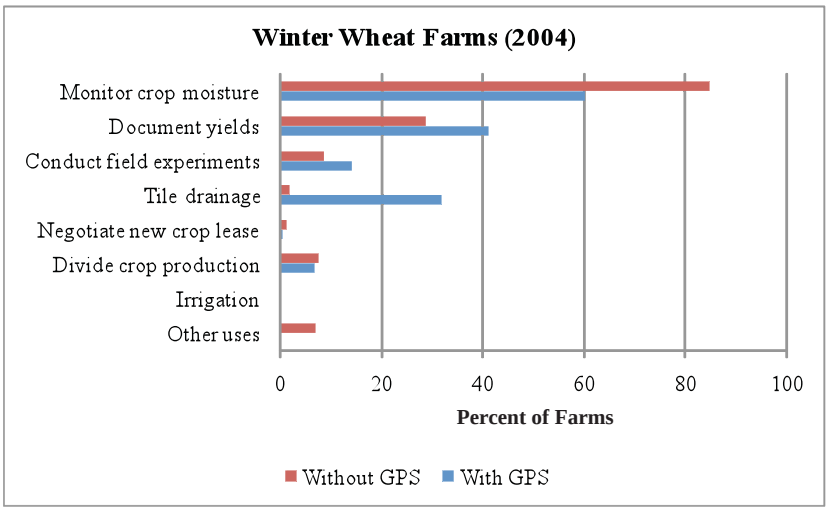

Figure 4. Use of Yield Monitor Data for Winter Wheat Farms With and Without a GPS Unit, 2004.

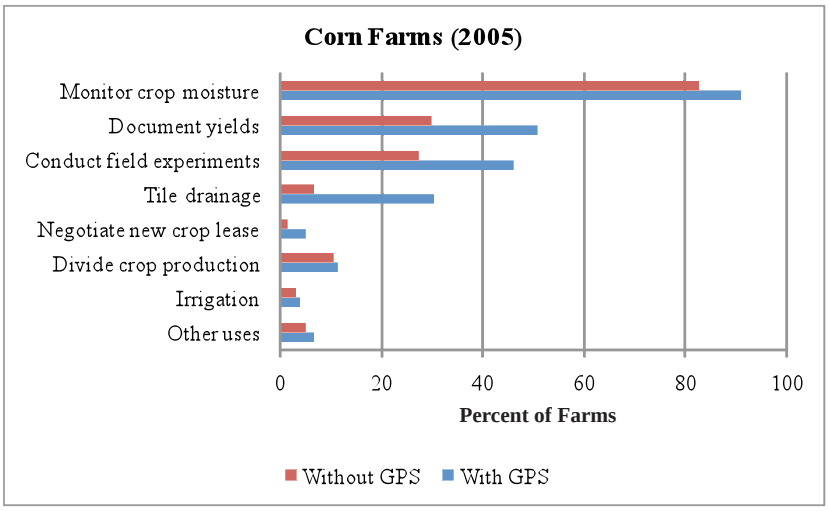

Figure 5. Use of Yield Monitor Data for Corn Farms With and Without a GPS Unit, 2005.

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DR. TERRY GRIFFIN is assistant professor - economics with the University of Arkansas Division of Agriculture in Little Rock.

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