

Yield Monitors in Potato Production

Precision Ag

ARABLE LAND ACROSS THE WORLD

courtesy US Geological Survey.



THE CHALLENGE

"With 9.5 billion people living on the earth by 2050, we will require an estimated 80% increase in agricultural outputs. The burden of this increase will fall on farmers - farmers who must now do more with less, while maintaining profitability." (article on Tomorrows Farm, Niagara College)



EXAMPLES OF TECHNOLOGIES IN AG

Information gathering:

- Yield Monitoring
- GPS based soil sampling
- Prescription mapping and variable rate application
- Using long-term satellite imagery
- Drone technology

"If you don't measure it, you can't manage it"







BENEFITS OF YIELD MAPPING:

- Identify extent of yield variability
- Compare to other information: soil types, pH and nutrient levels, topography
- Compare varieties, effects of different inputs
- Basis for designing prescription maps for variable rate fertilizer application
- Compare multiple years to identify effects of management decisions
- YOUR REPORT CARD



YIELD MAP – RAW DATA

							GRAH	IAM (18) by	Yield						
6 56 6	IFFIS (23)	CHAR	RLIE (16) CH	URCH (25)	DUNSTON (17) EDGAR (13)	GRAHAM (18)	HAZA (14)	HOMENORTH (22) H	DMESOUTH (21)	KERR (15) R	IDDEL (27)	SMALLEY (24)	SUBDIV (19)	WEATHERUP (26)
Menu					n Ti					Sec. 200		all a		Yield	(cwt/acr)
Color By										Contraction of the local division of the loc	1	I IIII		602	or more
Load									and the second		all all and			542	to 602
Truck	44.						-				1.00	1.10		482	to 542
Field	253				-	-			15		6 12	5.0		422	to 482
Bin			а.			-	6 1				1	1		361	to 422
Field & Bin			No.				Ч., °	14.	21.			11		301	to 361
Fuzzy Sel	44.				11		N ^{AP}	1,1						241	to 301
Fuzzy Load	252			6		20104	1.1.1		30		21.04			181	to 241
Load Date													100	120	to 181
Yield		4									1.1			60	to 120
Crop Temp	44.				<u>.</u>	1. C. J. 4.	an Winter				1 all		100	0	to 60
Air Temp	251			× 1.	d the	0-1/2	135	1					Re. Ar		than 0
Gr. Speed						100			1	1239-1			100	1055	
Ap. Speed		24			3.						a Total State	100	20		
Load Time	44						<u>1</u>				100	-	10 10		
Point	250					110	100	A PERSON		Soft.	.*	-	100		
Sequence				303	N	0		ft		1000	1.10	1	100		
> >> >			-79. 863	-79. 862	-7	79. 61	-79. 860	-79. 859	-79. 858	-79. 857	-79. 856	-79. 855	-79. 854	- 9	





DATA TRENDS

- Calculate nutrient removal
- Create management zones for Variable Rate strategies
- Formulate yield goals
- On Farm research for products or practices



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YIELD AS % OF AVERAGE

- Compare performance with all other monitored crops, other years
- Importance is stability of performance
- Reliability for making management zones



AgTech GIS

MAPPING SOFTWARE OPTIONS Crop Portal – Niagara College







The heart of the yield monitor is a weighing system designed for installation in nearly any harvester with a conveyor belt.













2-, 3-, and 4-load cell systems are available to suit belted chain conveyors with 2, 3, and 4 traction belts; or even dual conveyors, each with 2 traction belts.

JREENTRONICS

Conveyor with three traction belts. Requires three load cells.



Yield data is combined with GPS data to create a complete data file in csv format which is stored internally and copied to ruggedized USB flash drive.

The file is easily imported into common mapping software.

Stand-alone RiteYield system.



DATA INTEGRATION



Allows viewing yield maps in real time. Yield data are stored. Trimble FMx and

TMx and John Deere 2630 displays can upload data to your office or to cloud storage.

RiteYield system running on a Trimble TM2050



DATA INTEGRATION





Field Map: selected load is highlighted in pink



RITETRACE MAPS



Selected load is highlighted in pink.





Bin Map: sorted by harvest date



			<i>w</i>		- nu	-	KERR (15)	by Crop Temp				<i>w</i>			
All Fields BER	RIK (20)	BIFFIS (23)	CHARLIE (16)	CHURCH (25)	DUNSTON (17)	EDGAR (13)	GRAHAM (18)	HAZA (14)	HOMENORTH (22)	HOMESOUTH (21)	KERR (15)	RIDDEL (27)	SMALLEY (24)	SUBDIV (19)	WEATHERUP (26)
Menu	44													Crop 7	Гетр (F)
Color By	235	NO												75.2	or more
Load			1						-				212	72.0	to 75.2
Truck					1.5						6 3			68.7	to 72.0
Field	44. 234									14	in the			65.5	to 68.7
Bin					1		- hard		1. 9					62.2	to 65.5
Field & Bin			24	-	-	145			1		1	S.	n (b)	59.0	to 62.2
Fuzzy Sel	44.	11_	-			P. fuglati		IT OF			2-1-111-			55.8	to 59.0
Fuzzy Load				in It was	Luter	us f	Then		ALL HALL			1.15		52.5	to 55.8
Load Date		M	1.17	L'AN	Lake In		1							49.3	to 52.5
Yield	44.	WI	181			His	Jan III				-	he d		46.0	to 49.3
Crop Temp	232	- WA			PL	APT								42.8	to 46.0
Air Temp			Le:				and the second		-			34		less t	nan 42.8
Gr. Speed					2.1								9:12		
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Load Time			and the second						نا 31						
Point			761										See Some		
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> >> >			-79. 899	-79 898 8	797: 97 89	979 16 89	979. 5 894	-75	-79. 3 892	-79. 891	-79. 890	-79. 889	-79. 888		

Field Map: sorted by product temperature





Bin Map: sorted by product temperature



REPORTS

		Load 20	66	
Harvest Date C	rop Field Harvester Truck Bin Load Point	Error Data		
Menu	= 		266	Loa
Color By	-	·		< <<
Load	F	larvester	DIG	266
Truck	ר -	!ruck	005	267
Field	l S	Veight (cwt) > PC Weight (cwt)	329.1 329.1	268
Bin		· Logged	17-09-28 09:12:27	269
Field & Bin	1	vg. Air Temp (F)	55.30	270
Fuzzy Sel	P F	.vg. Crop Temp (F) ?lags	58.50 0	271
Fuzzy Load		:rrors	0	272
Load Date	E	rom Field:	GRAHAM (18) 145	273
Yield	I	loading Began	17-09-28 08:59:36	274
	F	loading Ended Real Time (s)	17-09-28 09:08:24 528	275
Air Temp	- F	(un Time (s)	432	276
Gr Speed	1	'o Bin: Cells	Bin3 (3)	277
An Speed	τ	Unloading Began	17-09-28 09:22:07	278
Load Time	F	Inloading Ended Real Time (s)	17-09-28 09:30:04 477	270
	F	(un Time (s) Pransit Time (s)	393 823	

Load Report



REPORTS

Bin Info Harvest Date Crop Field Harvester Truck Data Bin Point Load Menu Bin Color By 3E (3) Load 3W (4) Bin Total Weight First Last Truck 4E (1) Name (#) Unloads (cwt) Unload Unload Field 4W (2) 117,994 17-09-19 17-09-26 Bin 3E (3) 467 5NE (7) 128,997 3W (4) 448 17-09-27 17-09-29 Field & Bin 5NW (11) 87,098 4E (1) 289 17-09-13 17-09-16 5SE (5) Fuzzy Sel 95,886 17-09-16 17-09-18 4W (2) 300 5SW (6) Fuzzy Load 66,494 5NE (7) 220 17-10-06 17-10-08 MW7N (9) Load Date 97,372 385 17-10-12 17 - 10 - 175NW (11) MW7S (8) Yield 17-09-30 17-10-05 5SE (5) 374 121,257 Gr. Speed 32,985 5SW (6) 108 17-10-05 17-10-06 Ap. Speed MW7N (9) 201 58,093 17-10-10 17-10-11 60,483 Load Time MW7S (8) 211 17-10-09 17-10-10 Point 3,001 866,658 17-09-13 (10)17-10-17 Sequence >> >

Load Report



RiteTrace HARDWARE



Scanner – Transponder



RiteTrace HARDWARE



Scanner – Transponder



RiteTrace HARDWARE



Piler – equipped with sensors to precisely track the head of the piler.



Thank you!

GREENTRONICS

WHAT'S THE VALUE IN DETAILED TRACKING?

Many growers see maintaining traceability records as a burden and do not see this as adding much value to their business. How does a traceability system add value?

- 1. Manual records are not always accurate and do not offer much detail. RiteTrace collects data in great detail both in the field, at unloading, and in the bin. This adds real value to the traceability records.
- 2. Positive and negative aspects of crop quality in storage are easily linked to locations in fields, to harvest dates, and to harvest and weather conditions.
- 3. Provides transparency and clear information which will support and strengthen relationships between growers, packers, processors and buyers



VALUE (cont'd):

- 4. Knowledge can be used to improve management strategies in the field and in storage.
- 5. Required by Good Agricultural Practice (GAP) regulations in Canada, USA and elsewhere
- 6. Required by some processors, packers, and buyers.
- Automating traceability record keeping avoids the tedious jobs related to maintaining manual records in the field and at the storage.

NTRONICS

References:

- <u>https://www.ncinnovation.ca/specializations/agriculture-environmental-</u> <u>technologies-innovation-centre</u>
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- Sequential Adoption and Cost Savings from Precision Agriculture and Farm Profits and Adoption of Precision Agriculture by David Schimmelpfennig, USDA, 2016
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