Rotational Study to determine the impacts of including double crop sunflower(following winter wheat) in a typical corn: wheat: double crop soybean rotation.

Project Objectives

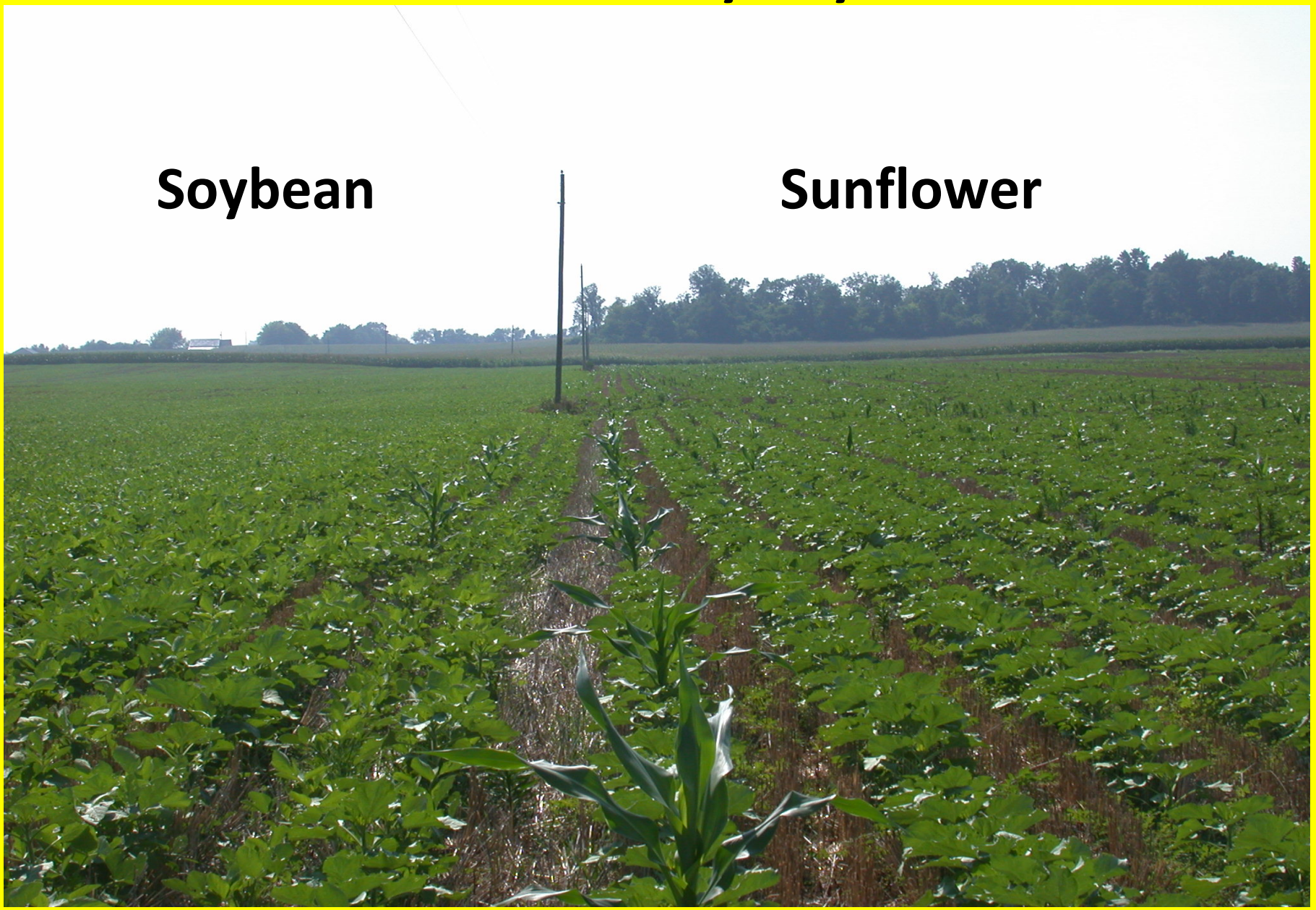
1:Yield Comparison between double crop Sunflower and double crop Soybean

2:Soil Nematode Classification and Quantification

3:Fertility Analysis

4:Relative corn yields

Rotational Study July 2011



Rotational Study September 2011

Relative yield and Economic Performance of DC Sunflower vs. DC Soybean

	CORN	SOYBEANS	WINTER WHEAT	WINTER CANOLA	DC SOYBEANS	DC SUNFLOWERS
Yield Goal/Acre	0	0	0	0	38.83	1740
Market Value/Unit	0	0	0	0	12	0.3
AMTA Payment/Acre(est)	0		0	0	0	0
LDP Payments/Acre (est)	0		0	0	0	0
Gross Return/Acre	0	0	0	0	465.96	522
Material Costs/Acre ($)						
Seed	0	0	0	0	60	35
Fertilizer	0	0	0	0	30	80
Lime	0	0	0	0	0	0
Herbicides	0	0	0	0	20	30
Insecticides	0	0	0	0	5	5
Fungicides	0	0	0	0	0	0
Crop Insurance	0	0	0	0	0	0
Land	0	0	0	0	0	0
Margin over Material Costs	0	0	0	0	**350.96**	**372**

Yields of all crops except sunflower are in bushels/acre. Sunflower yield is in lbs/acre.

Soybean Cyst Nematode Analysis

REPORT NUMBER
11-200-0038
REPORT DATE
Jul 22, 2011
ACCOUNT
1234
RECEIVED DATE
Jul 19, 2011

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CYST NEMATODE REPORT

Lab Number	Sample ID	Level Found	Units
22729545	BEANS 1B	516	eggs/cup
		1032	eggs/pint
		218	eggs/100 cc
22729546	BEANS 2B	0	eggs/cup
		0	eggs/pint
		0	eggs/100 cc
22729547	BEANS 3B	1459	eggs/cup
		2918	eggs/pint
		617	eggs/100 cc
22729548	BEANS 4B	565	eggs/cup
		1130	eggs/pint
		239	eggs/100 cc
22729549	BEANS 5B	0	eggs/cup
		0	eggs/pint
		0	eggs/100 cc

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

Classification of Soil Nematodes

Report Number
11-234-2206

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REPORT OF ANALYSIS

Mail to: [redacted]

For: (28320) CALDBECK CONSULTING LLC
(270)316-4316

Date Reported: 08/24/11
Date Received: 07/19/11
Date Sampled: 07/14/11

Lab number: 1875375 Sample ID: BEANS 4A

Analysis	Level Found	Units	Detection Limit	Method	Analyst-Date	Verified-Date
Lesion (Pratylenchus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Stunt (Tylenchorhynchus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Spiral (Helicotylenchus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Stubby Root (Trichodorus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Dagger (Xiphinema)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Ring (Criconemoides)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Sting (Belonolaimus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Lance (Hoplolaimus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Sheath (Hemicycliophora)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Non-Parasitic (Benign)	186	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Cyst (Heterodera/Globodera)	26	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Root Knot (Meloidogyne)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Needle (Longidorus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Stem (Ditylenchus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Pin (Paratylenchus)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Foliar (Aphelenchoides)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Subanguina	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22
Reniforms (Rotylenchulus Reniformis)	n.d.	#/100cc	26	MICROSCOPIC IDENTIFICATION	gcn-08/22	gcn-08/22

Double Crop Pre-emergence Fertility

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ACCOUNT
1234

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PAGE 1/1

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SOIL ANALYSIS REPORT

SAMPLE IDENTIFICATION	ORGANIC MATTER (MODIFIED LOI)	PHOSPHORUS			NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY	PERCENT BASE SATURATION (COMPUTED)				
		P_1 (WEAK BRAY) 1:7	P_2 (STRONG BRAY) 1:7	BICARBONATE P	POTASSIUM K	MAGNESIUM Mg	CALCIUM Ca	SODIUM Na	SOIL pH 1:1	BUFFER INDEX	C.E.C.	% K	% Mg	% Ca	% H	% Na
	percent RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE			meq/100g					
EANS 1B	1.8 L	35 VH	56 H		166 VH	130 M	1922 H		6.5	6.9	12.0	3.5	9.0	80.1	7.4	
EANS 2B	2.1 L	18 M	32 M		115 M	96 L	1602 H		6.5	6.9	9.8	3.0	8.2	81.7	7.1	
EANS 3B	2.1 L	15 M	32 M		126 H	76 L	1489 VH		6.7		8.4	3.8	7.5	88.7	0.0	
EANS 4B	1.7 L	16 M	24 M		157 VH	88 M	1410 VH		6.8		8.2	4.9	8.9	86.2	0.0	
EANS 5B	2.3 L	17 M	34 M		110 M	84 L	1304 H		6.1	6.8	8.7	3.2	8.0	74.9	13.9	
F 1B	1.9 L	41 VH	57 H		118 M	91 L	1387 H		6.3	6.9	8.9	3.4	8.5	77.9	10.2	
F 2B	1.4 VL	15 M	26 M		159 VH	79 L	1438 H		6.3	6.9	9.3	4.4	7.1	77.3	11.2	
F 3B	1.4 VL	21 M	40 H		203 VH	64 L	1213 H		6.6	7.0	7.6	6.8	7.0	79.8	6.4	
F 4B	1.5 VL	24 H	48 H		118 M	54 L	1262 VH		6.6	7.0	7.6	4.0	5.9	83.0	7.1	
F 5B	2.7 M	21 M	40 H		113 M	74 L	1506 H		6.3	6.9	9.4	3.1	6.6	80.1	10.2	

NITRATE-N (FIA)									Total lbs/A	SULFUR S ICAP	ZINC Zn DTPA	MANGANESE Mn DTPA	IRON Fe DTPA	COPPER Cu DTPA	BORON B SORB. DTPA	EXCESS LIME RATE	SOLUBLE SALTS 1:1	
SURFACE			SUBSOIL 1			SUBSOIL 2												
ppm	lbs/A	depth (in)	ppm	lbs/A	depth (in)	ppm	lbs/A	depth (in)		ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE		mmhos/cm RATE	
7	13	0-6							13	5 VL	5.0 H	21 H	51 VH	1.5 H	0.7 L			
8	14	0-6							14	7 L	5.6 H	19 H	18 H	1.8 H	0.8 M			
9	16	0-6							16	7 L	6.1 VH	22 H	27 VH	2.1 VH	0.7 L			
9	16	0-6							16	9 L	2.9 M	14 H	18 H	1.7 H	0.9 M			
9	16	0-6							16	7 L	4.2 H	17 H	42 VH	2.7 VH	0.8 M			
9	16	0-6							16	8 L	4.4 H	29 H	94 VH	1.8 H	0.8 M			
7	13	0-6							13	8 L	3.8 H	20 H	23 H	1.7 H	0.7 L			
14	25	0-6							25	8 L	6.6 VH	27 H	63 VH	1.7 H	0.7 L			
7	13	0-6							13	9 L	6.6 VH	22 H	21 H	1.7 H	0.6 L			
11	20	0-6							20	7 L	9.4 VH	13 H	42 VH	2.4 VH	0.7 L			

REV. 12/03

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

Corn Pre-Plant Fertility

REPORT NUMBER
12-040-0096
REPORT DATE
Feb 13, 2012
ACCOUNT
28320
RECEIVED DATE
Feb 9, 2012

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IDENTIFICATION
CALDBECK CONSULTING LLC

SOIL ANALYSIS REPORT

LAB NUMBER *236*	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	RATE	PHOSPHORUS P_1 (WEAK BRAY) 1:7 ppm	RATE	PHOSPHORUS P_2 (STRONG BRAY) 1:7 ppm	RATE	OLSEN BICARBONATE P ppm	RATE	NEUTRAL AMMONIUM ACETATE(EXCHANGEABLE) POTASSIUM K ppm	RATE	MAGNESIUM Mg ppm	RATE	CALCIUM Ca ppm	RATE	SODIUM Na ppm	RATE	pH SOIL pH 1:1	BUFFER INDEX	CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED) % K	% Mg	% Ca	% H	% Na
81324	SUNFLWR1	2.0	L	13	L	34	M			164	VH	105	M	1736	VH			7.0		10.0	4.2	8.8	87.0	0.0	
81325	SUNFLWR2	1.6	L	22	H	46	H			135	H	71	L	1333	VH			6.7		7.6	4.6	7.8	87.6	0.0	
81326	SUNFLWR3	1.8	L	37	VH	63	VH			179	VH	79	L	1393	VH			6.9		8.1	5.7	8.1	86.2	0.0	
81327	SUNFLWR4	1.9	L	26	H	53	H			154	VH	84	M	1443	VH			6.7		8.3	4.8	8.4	86.8	0.0	
81328	SUNFLWR5	2.0	L	8	L	13	L			182	VH	97	M	1455	H			6.5	6.9	9.2	5.1	8.8	79.1	7.0	
81329	SOYBEAN 1	2.0	L	10	L	32	M			130	H	90	L	1535	VH			7.1		8.8	3.8	8.5	87.7	0.0	
81330	SOYBEAN 2	1.8	L	7	VL	46	H			139	H	90	M	1316	H			6.4	6.9	8.5	4.2	8.8	77.4	9.6	
81331	SOYBEAN 3	1.7	L	36	VH	86	VH			191	VH	96	L	1663	VH			7.0		9.6	5.1	8.3	86.6	0.0	
81332	SOYBEAN 4	2.0	L	21	M	35	M			203	VH	94	L	1598	H			6.5	6.9	10.1	5.2	7.8	79.1	7.9	
81333	SOYBEAN 5	1.9	L	27	H	50	H			200	VH	82	L	1489	VH			6.7		8.6	6.0	7.9	86.1	0.0	

LAB NUMBER *236*	NITRATE-N (FIA) SURFACE ppm	SURFACE lbs/A	SURFACE depth (in)	SUBSOIL 1 ppm	SUBSOIL 1 lbs/A	SUBSOIL 1 depth (in)	SUBSOIL 2 ppm	SUBSOIL 2 lbs/A	SUBSOIL 2 depth (in)	Total lbs/A	SULFUR S ICAP ppm	RATE	ZINC Zn DTPA ppm	RATE	MANGANESE Mn DTPA ppm	RATE	IRON Fe DTPA ppm	RATE	COPPER Cu DTPA ppm	RATE	BORON B SORB. DTPA ppm	RATE	EXCESS LIME RATE	SOLUBLE SALTS 1:1 mmhos/cm	RATE
81324	3	5	0-6							5	13	M	4.0	H	13	H	31	VH	1.0	M	0.5	L			
81325	2	4	0-6							4	11	L	4.2	H	18	H	21	H	1.1	M	0.5	L			
81326	2	4	0-6							4	10	L	5.2	H	12	M	20	H	4.8	VH	0.4	VL			
81327	1	2	0-6							2	11	L	4.2	H	12	M	19	H	1.2	M	0.4	VL			
81328	3	5	0-6							5	13	M	5.0	H	17	H	29	VH	1.1	M	0.5	L			
81329	3	5	0-6							5	9	L	3.9	H	11	M	26	VH	0.8	L	0.4	VL			
81330	3	5	0-6							5	12	L	4.0	H	11	M	33	VH	1.2	M	0.4	VL			
81331	3	5	0-6							5	12	L	3.9	H	12	M	25	VH	0.9	M	0.5	L			
81332	3	5	0-6							5	12	L	4.5	H	14	H	26	VH	1.0	M	0.5	L			
81333	2	4	0-6							4	10	L	3.6	H	16	H	21	H	1.2	M	0.5	L			

REV. 12/03

The above analytical results apply only to the sample(s) submitted. Samples are retained a maximum of 30 days.

Rotational Study Corn April 2012

Sunflower to Corn

Soybean to Corn

April 2012

SUNFLOWER / SOYBEAN ROTATION STUDY NSA 2010 - 2012
CORN YIELD 2012

Trt	Population	Harvest Wt. lbs	Water %	Area ac.	Test Wt	Yld bu. (15.5)	
SF 1	25,545	7370	24.3	0.772	52.3	152.72	Av.
SF 2	25,545	7725	24.9	0.771	51.9	159.01	155.86
SB 1	26,000	6850	22.9	0.845	54.3	132.08	Δ 18.37
SB 2	26,000	7100	23.8	0.800	53.60	142.91	137.49

Discussion Points

- **Record heat and drought in 2012 resulted in better corn yields following sunflower…deeper rooting characteristics of sunflowers positively impacted corn rooting?**
- **Increased residue retention on sunflower ground had a non significant impact on planter performance, frost response on corn was higher on sunflower ground..reflectance of early season sunshine resulting in cooler ground?**

Discussion Points cont/d

- *Increased residue retention on sunflower ground due to one or a combination of:*

- **More open less humid sunflower canopy**
- **Harvesting height differences**
- **Residual N in bean stalks enhancing decomposition**

Residue retention ++ for southern soils

Conclusion

Sunflower is an economically and rotationally viable double crop option in Kentucky soft red winter wheat rotations

Thank you: brian.caldbeck@caldbeckconsulting.com