

2012 KBS LTER Agronomic Report



Results of 2012 Agricultural Field Operations

**Long-term Ecological Research Site
W. K. Kellogg Biological Station
Michigan State University**

This report is designed to provide a brief summary of the field operations and agricultural data collected during 2012 on the Long-term Ecological Research Site (LTER) at the W.K. Kellogg Biological Station (KBS). It is not designed to provide an in-depth analysis of the experiments and the underlying factors leading to the data. All results are preliminary and not citable. For final data sets please see the KBS LTER data catalog on the LTER web page www.lter.kbs.msu.edu

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Table of Contents

LTER Main Site Treatments

LTER Summary from Main Site Treatments T1, T2, T3, and T4—Soybean Grain Yields
from Different Agronomic Management Practices 1

LTER Nitrogen Fertility Rate Study

LTER Resource Gradient Experiment (Nitrogen Fertility Rate Study or N-rate Study) —
Grain Yields from Non-irrigated (Dry-land) and Irrigated Management with
Different Nitrogen Fertilization Levels 3

2012 Rainfall

Precipitation (inches) on the KBS-LTER Main Site at the W.K. Kellogg Biological Station,
Michigan State University 4



Summary:

LTER Main Site Treatments T1, T2, T3, and T4

Yields of soybeans grown under agricultural different management practices:

- T1** Conventionally tilled field with fertilizer and/or herbicides as necessary;
- T2** No-tilled with the addition of fertilizer and/or herbicides as necessary;
- T3** Tilled field with reduced levels of fertilizer and/or herbicides; In fall of 2011, rye was planted as a cover crop after the corn harvest. The cover crop was tilled in at the start of the 2012 growing season.
- T4** Tilled Biologically-based (Organic) with no additions of fertilizers or herbicides; In fall of 2011, rye was planted as a cover crop after the corn harvest. The cover crop was tilled in at the start of the 2012 growing season.

Results

Yields varied by treatment in 2012 with T2 (no-till) yielding ~ 44% more grain than the other treatments which did not differ much.

The lack of rainfall during the peak growing season had a major effect on the LTER soybean yields from the 2012 growing season. T2 (no-till) conserved the most moisture and therefore yielded the most grain.

2012 LTER Soybeans	Treatment Grain Yield (bu/A)			
	T1	T2	T3	T4
Replicate1	14.8	26.3	18.4	19.0
Replicate2	18.3	29.8	25.1	20.0
Replicate3	23.8	29.2	19.7	19.4
Replicate4	15.7	30.0	18.4	18.4
Replicate5	17.6	25.7	21.3	14.9
Replicate6	25.8	26.8	22.2	16.6
Average	19.3	28.0	20.9	18.0

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Crop:	Soybean (T1)	Soybean (T2)	Soybean (T3)	Soybean (T4)
Variety:	Pioneer 92Y30	Pioneer 92Y30	Pioneer 92Y30	Blue River Hybrid 19AR1
Planting date:	May 19, 2012	May 21, 2012	May 23, 2012	June 6 & 7, 2012
Irrigation:	None	None	None	None
Tillage:	Tilled: May 16, 2012 Chisel plow May 17, 2012 Soil finish May 19, 2012 Cultimulched	No-till	Tilled: May 16, 2012 Chisel plow May 18, 2012 Soil finish May 22, 2012 Cultimulched	Tilled: May 18, 2012 Chisel plow May 18, 2012 Soil finish May 23, 2012 Cultimulched
Row Spacing:	15 inches	15 inches	15 inches	30 inches
Planting Population (seeds/A):	180,000	180,000	180,000	180,000
Harvest date:	October 11-12	October 11-12	October 11-12	October 25
Fertilization:	April 11, 2012 Dolomitic Lime (18.61% Ca, 9.5% Mg) at 2 t/A reps 1-4, 6; 1 t/A rep 5. April 17, 2012 0-0-60 55.2 lbs K2O/A April 19, 2012 11-52-0 6.6 lbs N/A 31.2 lbs PO4/A	April 11, 2012 Dolomitic Lime (18.61% Ca, 9.5% Mg) at 2 t/A reps 3,4, and 5; 1 t/A reps 1,2, and 6. April 13, 2012 0-0-60 55.2 lbs K2O/A April 23, 2012 11-52-0 6.6 lbs N/A 31.2 lbs PO4/A	April 11, 2012 Dolomitic Lime (18.61% Ca, 9.5% Mg) at 2 t/A reps 1, 2, 4, and 5; 1 t/A reps 3 and 6. April 17, 2012 0-0-60 55.2 lbs K2O/A April 23, 2012 11-52-0 6.6 lbs N/A 31.2 lbs PO4/A	April 11, 2012 Dolomitic Lime (18.61% Ca, 9.5% Mg) at 2 t/A reps 2, 3, 4, and 5; 1 t/A reps 1 and 6. No other fertilizer was applied to T4 plots.
Cover Crop	None	None	Cereal Rye	Organic Cereal Rye
Herbicide Burndown:	None	May 10, 2012 RoundUp PowerMax 1 qt/A Ammonium Sulfate 3.4 lbs/A	None	None
Herbicide Postemergence:	June 22, 2012 RoundUp PowerMax 22 oz/A Ammonium Sulfate 3.4 lbs/A	June 25, 2012 RoundUp PowerMax 22 oz/A Ammonium Sulfate 3.4 lbs/A	June 22, 2012 RoundUp PowerMax 22 oz/A Ammonium Sulfate 3.4 lbs/A	None
Insecticide:	August 3, 2012 Brigade 6 oz/A	August 3, 2012 Brigade 6 oz/A	August 3, 2012 Brigade 6 oz/A	None
Rotary Hoe:	None	None	None	June 8, 2012 June 15, 2012 June 22, 2013
Row Cultivation:	None	None	None	July 5, 2012 July 23, 2012

LTER Resource Gradient Experiment (N-rate Study) Grain Yields from Non-irrigated (Dry-land) and Irrigated Management

Purpose

Compare grain yields under different levels of nitrogen fertilization with non-irrigated (dry-land) and irrigated soybeans.

Rotational sequence: Soybean (2009, 2012) - Winter Wheat (2010, 2013) - Corn (2008, 2011).

Fertilizer was applied in the form of ammonium nitrate (34-0-0) broadcast across each plot and each treatment according to specific

Results

The addition of nitrogen to soybeans did not increase soybean yields.

No direct comparison between the dry-land and the irrigated areas are statistically valid due to the experimental design.

The N-rate dry-land yields were higher than all the LTER main site yields in 2012.

Fertilizer Lbs N/A	Dry-land Avg Yield (bu/A)	Irrigated Avg Yield (bu/A)
0	35.91	74.25
15	38.26	76.62
30	38.01	76.19
45	37.31	75.28
60	39.05	74.13
75	38.51	74.66
90	40.38	75.33
110	38.64	75.07
130	37.33	77.67

Crop:	Soybeans
Variety:	Pioneer 92Y30
Planting date:	May 22, 2012
Irrigation:	None vs. Irrigated (20 times) for a total of 16.9 inch of H ₂ O applied.
Tillage:	No-Till
Row Spacing:	15 inches
Population:	180,000 seeds/A
Harvest date:	October 2, 2012
Fertilization:	<p>May 21, 2012 0-0-60 @ 130 lbs K₂O/A</p> <p>May 21, 2012 Lime 1.0, 2.0, & 2.5 tons/A, refer to ag-log for specific amounts by plot.</p> <p>May 22, 2012 0-46-0 0, 30, and 50 lbs P₂O₅/A, refer to ag-log for specific amount by plot.</p>
Herbicide Burndown:	<p>May 22, 2012 RoundUp Power Max 32 oz/A with Ammonium Sulfate 3.4 lbs/A</p>
Herbicide Postemergence:	<p>June 28, 2012 RoundUp Power Max 22 oz/A with Ammonium Sulfate 3.4 lbs/A</p>
Insecticide (dry-land only) :	<p>August 3, 2012 Non-irrigated ground received Brigade @ 6 oz/A. Due to low insect pressure on irrigated ground no insecticide application was made.</p>

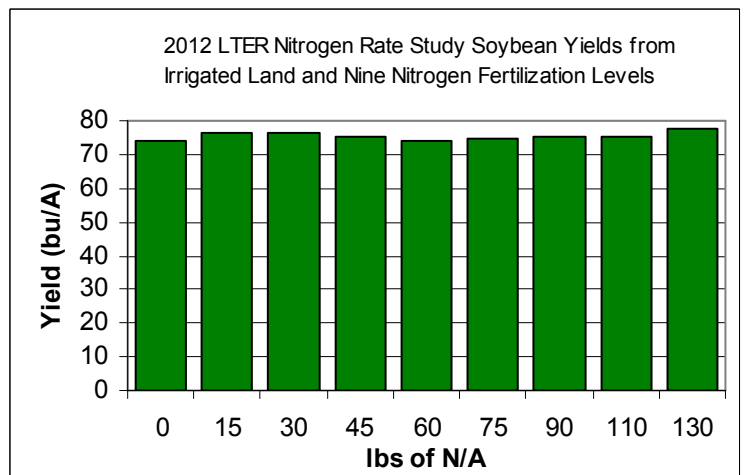
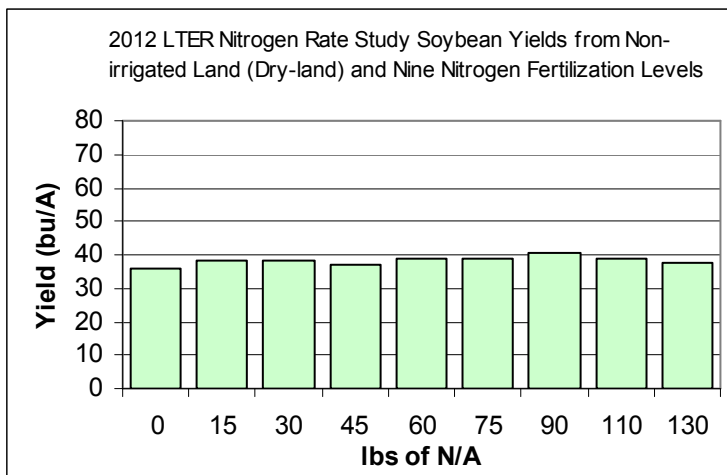


Chart 1. Precipitation (inches) on the KBS-LTER Main Site at the W.K. Kellogg Biological Station, Michigan State University.

Precipitation data is reported beginning 10/1/11 through 11/30/12 to reflect growing condition for winter wheat.

Day	October	November	December	January	February	March	April	May	June	July	August	September	October	November
1				0.28	0.00	0.08	0.00	0.00	0.70	0.00	0.00	0.08	0.00	0.00
2	0.00		0.11	0.14	0.00	0.43	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00
3				0.00	0.00	0.13	0.64	0.09	0.00	0.00	0.00	0.00	0.05	0.00
4			0.42	0.00	0.00	0.05	0.00	0.05	0.00	0.00	0.02	0.64	0.28	0.00
5		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
7		0.04	0.00	0.00	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.04	0.04	0.00
8		0.37		0.00	0.00	0.33	0.01	0.00	0.00	0.24	0.00	0.03	0.00	0.00
9		0.29	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.09	0.01	0.00
10		0.61		0.00	0.17	0.00	0.00	0.00	0.00	0.00	1.21	0.00	0.23	0.00
11		0.31		0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00
12				0.36	0.00	0.29	0.00	0.05	0.00	0.00	0.00	0.00	0.10	0.39
13	0.40			0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.13	1.39	0.00
14	0.05	0.06	1.04	0.06	0.07	0.00	0.02	0.00	0.00	0.27	0.05	0.25	0.92	0.00
15	0.07	0.00	0.07	0.00	0.12	0.04	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16				0.07	0.13	0.00	0.68	0.00	0.03	0.00	0.50	0.00	0.00	0.00
17			0.11	0.28	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.13	0.00
18	0.01	0.00		0.00	0.00	0.05	0.00	0.00	0.04	0.00	0.00	0.16	0.47	0.00
19	0.81	0.00	0.00	0.14	0.00	0.00	0.09	0.00	0.00	0.65	0.00	0.00	0.72	0.00
20	1.39	0.00	0.00	0.21	0.00	0.00	0.45	0.08	0.00	0.00	0.00	0.03	0.00	0.01
21		0.00	0.08	0.01	0.06	0.00	0.00	0.09	0.06	0.00	0.00	0.23	0.00	0.00
22		0.78	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.76	0.05
23		0.00	0.00	0.29	0.14	1.37	0.00	0.00	0.00	0.01	0.00	0.02	0.06	0.05
24			0.00	0.00	0.61	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
25	0.43		0.00	0.00	0.08	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26		0.12		0.20	0.00	0.00	0.01	0.16	0.00	0.36	0.21	0.00	0.17	0.00
27	0.00	0.47		0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.22	0.00	0.00	0.00
28	0.07	0.04		0.14	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.18	1.15	0.01	0.25	0.64	0.00	0.08	0.00	0.02	0.00	0.00	0.00	0.00	0.00
30	0.06	0.02	0.39	0.00	0.00	0.25	0.69	0.00	0.00	0.00	0.00	0.00	0.17	0.00
31	0.03			0.01	0.00	0.00	0.00	0.56	0.20	0.00	0.00	0.00	0.04	0.00
Monthly Totals 2011/2012	3.52	4.26	2.44	2.69	2.04	3.06	4.25	1.18	0.89	1.78	2.75	2.27	5.59	0.5
Monthly Average Rainfall	3.2	2.6	2.2	1.9	1.6	2.3	3.2	3.4	4.0	2.8	4.1	3.9	3.2	2.6

Average rainfall based on the average of 31 complete years between 1931 and 1995 from the National Climatic Data Center Cooperative Station at Gull Lake Biological Station, Kalamazoo County, Michigan

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