

2011 Protocol for Biodiversity Study
 LTER at Kellogg Biological Station, Michigan State University

System	Treatment	----- Plot Numbers -----				----- Crop Rotation -----
		Rep 1	Rep 2	Rep 3	Rep 4	
A	B1	106	201	303	401	Fall Fallow
A	B2	102	206	316	402	Spring Fallow
B	B3	111	203	306	403	Wheat covers A & C – Corn covers A & C – Soybeans cover B
B	B4	104	220	307	404	Corn covers A & C – Soybeans cover B – Wheat covers A & C
B	B5	114	217	312	405	Soybeans cover B – Wheat covers A & C – Corn covers* A & C
C	B6	107	207	317	406	Wheat cover A – Corn cover A – Soybeans
C	B7	105	219	305	407	Corn cover A – Soybeans – Wheat cover A
C	B8	118	214	310	408	Soybeans – Wheat cover A – Corn cover A
D	B9	119	205	314	409	Wheat – Corn – Soybeans
D	B10	117	209	320	410	Corn – Soybeans – Wheat
D	B11	110	216	309	411	Soybeans – Wheat – Corn
E	B12	109	202	313	412	Soybeans – Corn
E	B13	113	212	319	413	Corn – Soybeans
E	B14	115	204	304	414	Soybeans – Wheat
F	B15	112	213	301	415	Corn cover A – Corn cover A – Corn cover A
F	B16	101	210	308	416	Soybeans cover C – Soybeans cover C – Soybeans cover C
F	B17	116	211	302	417	Wheat cover A – Wheat cover A – Wheat cover A
G	B18	108	208	311	418	Corn – Corn – Corn
G	B19	103	218	315	419	Soybeans – Soybeans – Soybeans
G	B20	120	215	318	420	Wheat – Wheat – Wheat
H	B21	100	200	300	421	Continuous Fallow

*Cover A: Red Clover
 Cover B: Crimson Clover
 Cover C: Cereal Rye

System	----- Descriptions -----
A	Fallow system: No crop is planted. Plots are tilled once a year.
B	One annual crop with two cover crops. Three year crop rotation.
C	One annual crop with one cover crop. Three year crop rotation.
D	One annual crop with no cover crop. Three year crop rotation.
E	One annual crop with no cover crop. Two year crop rotation.
F	One annual crop with one cover crop. Monoculture cropping system (no crop rotation).
G	One annual crop with no cover crop. Monoculture cropping system (no crop rotation).
H	Continuous fallow system: No cover, no crop growth. Plots are tilled as needed (2 - 6 times) a year to prevent plant growth from becoming established.

Research Objective: Incorporating biological diversity into weed management. Determine the impact of crop rotation and cover crops on weed communities in row crops.

Notes: **All plots will be managed like the LTER main site treatment 4 plots.**

No herbicides and no synthetic nitrogen will be used on any treatment.

This study was established in 2000. In 2000 and 2001 some treatments received fertilizer and herbicides.

Beginning in 2002 all treatments and plots have been treated like the LTER main site treatment 4, no herbicides and no synthetic fertilizer.

Plot size = 30' x 90' (9 meters x 27meters).

This is a working protocol used for planning purposes. Due to potential changes in chemicals, fertilizer, varieties planted, planting dates etc... please refer to the agronomic field log for actual field operations that take place during 2011.

System A: Treatments B1 and B2. Fallow system. No crop is planted. Plots are tilled once a year.

Treatment B1 Fall Fallow: No crop is planted. Plots are chisel plowed and soil finished once a year.

Treatment B2 Spring Fallow: No crop is planted. Plots are chisel plowed and soil finished once a year.

System B: Treatments B3, B4, and B5. These plots will have one annual crop with two cover crops, three year crop rotation.

Treatment B3: Rotation Sequence Wheat - Corn - Soybeans Rotation.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Chisel plow and soil finish before planting corn in late April or early May, when corn is knee high plant red clover. After the corn is harvested no-till c. rye into the clover. Chisel plow c. rye and clover the following spring and plant soybeans, when soybeans are knee high plant crimson clover. Harvest soybeans in September or October. After soybean harvest chisel plow and soil finish before planting winter wheat. In February or March frost seed red clover. Harvest wheat in July; allow red clover to grow until September or October. In September or October mow the clover and plant c. rye. The following spring chisel plow and soil finish before planting corn.

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.
No herbicides will be used to control weeds.
No insecticides will be applied to control insects.

Treatment B4: Rotation Sequence Corn - Soybeans - Wheat Rotation.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Same description as listed in treatment B3. The idea of treatments B3, B4, and B5 is that each crop rotation is planted ever year. (i.e. If B3 is in corn B4 will have soybeans and B5 will have winter wheat. If B3 has soybeans B4 will have winter wheat and B5 will have corn. If B3 has winter wheat B4 will have corn and B5 will have soybeans.)

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.
No herbicides will be used to control weeds.
No insecticides will be applied to control insects.

Treatment B5: Rotation Sequence Soybean - Wheat - Corn Rotation.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Same description as listed in treatment B3. The idea of treatments B3, B4, and B5 is that each crop rotation is planted ever year. (i.e. If B3 is in corn B4 will have soybeans and B5 will have winter wheat. If B3 has soybeans B4 will have winter wheat and B5 will have corn. If B3 has winter wheat B4 will have corn and B5 will have soybeans.)

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.
No herbicides will be used to control weeds.
No insecticides will be applied to control insects.

This is a working protocol used for planning purposes. Due to potential changes in chemicals, fertilizer, varieties planted, planting dates etc... please refer to the agronomic field log for actual field operations that take place during 2011.

System F: Treatments B15, B16, and B17. One annual crop with one cover crop. Monoculture cropping system (no crop rotation).

Treatment B15: Continuous corn.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Chisel plow and soil finish before planting corn in late April or early May, when corn is knee high plant red clover. Harvest corn in October or November. Let plot remain ideal until the following spring. Chisel plow, soil finish and plant corn the following spring.

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.

No herbicides will be used to control weeds.

No insecticides will be applied to control insects.

Treatment B16: Continuous soybeans.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Plant soybeans in May. Harvest soybeans in September or October. After harvesting soybeans plant c. rye. Let plots remain ideal until the following spring, chisel plow, soil finish and plant soybeans.

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.

No herbicides will be used to control weeds.

No insecticides will be applied to control insects.

Treatment B17: Continuous winter wheat.

Tillage: Conventional, chisel plow and soil finish.

Planting Time: Plant winter wheat in late September or early October. In February or March frost seed red clover. Harvest wheat in July, allow red clover to grow until September. Chisel plow and soil finish before planting wheat in September or October.

Fertilization: None

Weed/Insect Control: Cultivate/Rotary hoe as needed to control weeds.

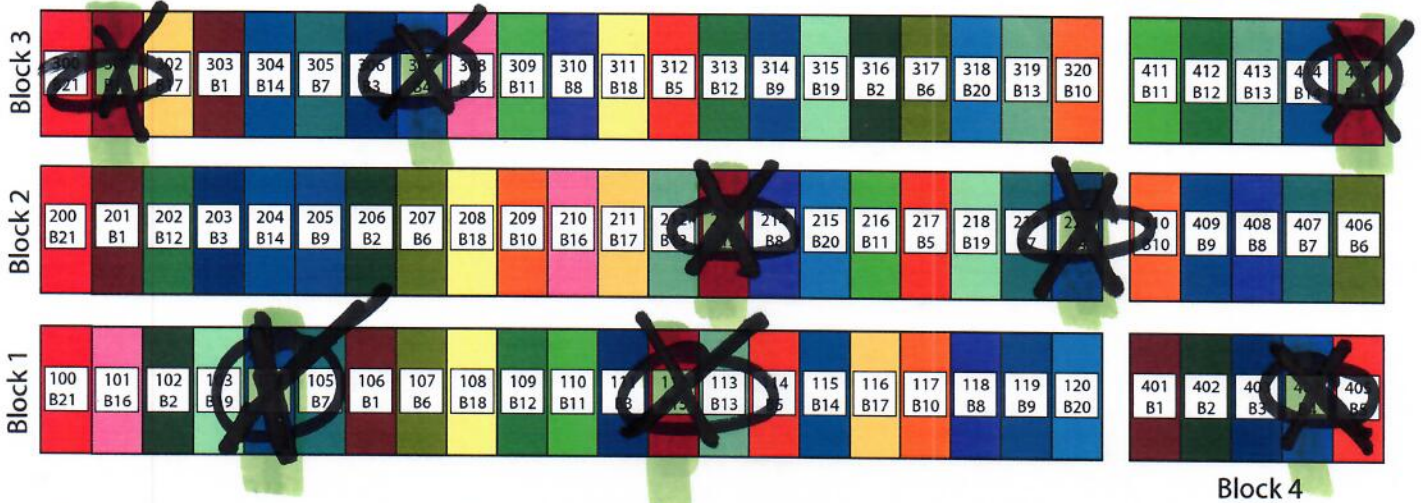
No herbicides will be used to control weeds.

No insecticides will be applied to control insects.

This is a working protocol used for planning purposes. Due to potential changes in chemicals, fertilizer, varieties planted, planting dates etc... please refer to the agronomic field log for actual field operations that take place during 2011.

KBS LTER Biodiversity Study

421	420	419	418	417	416
B21	B20	B19	B18	B17	B16

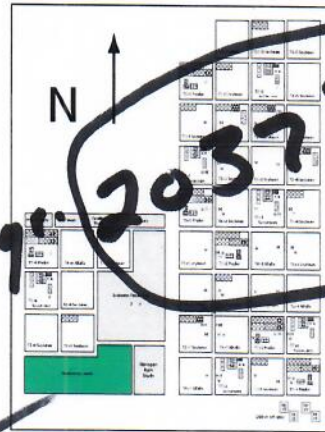


Treatment	Description	System
B1	F _{fall}	A
B2	F _{spring}	A
B3	C _{cov2} - S - W _{cov2}	B
B4	S - W _{cov2} - C _{cov2}	B
B5	W _{cov2} - C _{cov2} - S	B
B6	C _{cov1} - S - W _{cov1}	C
B7	S - W _{cov1} - C _{cov1}	C
B8	W _{cov1} - C _{cov1} - S	C
B9	C - S - W	D
B10	S - W - C	D
B11	W - C - S	D
B12	C - S	E
B13	S - C	E
B14	W - S	E
B15	C _{cov1}	F
B16	S _{cov1}	F
B17	W _{cov1}	F
B18	C	G
B19	S	G
B20	W	G
B21	T	H

Description Key

- F = Fallow
- S = Soybean
- C = Corn
- W = Wheat (red)
- T = Tilled and cultivated
- cov1 = 1-species cover (legume)
- cov2 = 2-species cover (legume + small grain)

Location within main LTER site



1st fill
7174 gr.
empty 1990 yr.
2nd fill
7636 gr.
empty
3600

System Key	Trt	Total Species	Species/year
A	B1-2	10	5-7
B	B3-5	5	1-3
C	B6-8	4	1-2
D	B9-11	3	1
E	B12-14	2	1
F	B15-17	2	2
G	B18-20	1	1
H	B21	0	0

All treatments established May 2003
Each plot is 30' X 90' (9.1m x 27.4m)

5137
+ 4036
91739
20-2165
24000
0.6 A.
33 lbs/A