

2017 Protocol for Biodiversity Gradient Experiment
 LTER at Kellogg Biological Station, Michigan State University

The Biodiversity Gradient Experiment was established on the LTER main site in 2000 to investigate the effect of plant species diversity across a gradient ranging from bare ground to 1, 2, 3, 4, 6 and 10 species. Small plots (9 × 30 m) are within four randomized complete blocks and are managed much like the MCSE Biologically Based system (i.e., no synthetic chemical inputs).

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
B	B4	104	220	307	404	Corn _{covers A & C} – Soybeans – Wheat _{covers A & C}
B	B5	114	217	312	405	Soybeans – 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 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.

Continuous fallow system (treatment B21) was introduced in the Biodiversity Study in 2003.

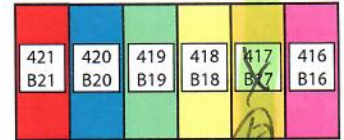
Plot size = 30' x 90' (9 meters x 27meters).

3-3-2017

frost seed Red clover

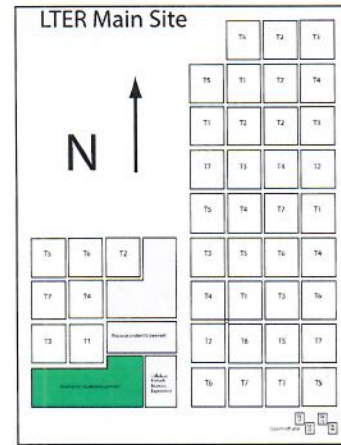
KBS LTER Biodiversity Study

8:30 Sunny 19°F 1/2" - 1" snow / 9:00 20°
2 - 5mph west wind / 5-7mph NW Sunny.



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

Location within main LTER site



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)

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

Each plot is 30' X 90' (9.1m x 27.4m)

MEDIUM RED CLOVER

LOT NO:

P75B-16-SALINO-1-CTD



P 7 5 B - 1 6 - S A L I N O -

34.00 % Coating Material

PURE SEED:	65.64 %
CROP SEED:	0.05 %
INERT MATTER:	34.28 %
WEED SEED:	0.03 %
NOXIOUS WEED SEED:	None Claimed

GERMINATION:	80.00 %
HARD SEED:	10.00 %
DORMANT SEED:	0.00 %
ORIGIN:	ORE
TEST DATE:	07/2016

THE CISCO COMPANIES

INDIANAPOLIS IN 46219-4936

Net Weight: 50 Pounds (22.68 Kg)



9 C M R C T

Notice to Buyer We warrant that seeds or bulbs shown on this order have been labeled as required under State and Federal Seed Laws and that they conform to the label description. We make no other or further warranty, expressed or implied. No liability hereunder shall be asserted unless the buyer or user reports to the warrantor within a reasonable period after discovery of any conditions that might lead to a complaint. Our liability on this warranty is limited in amount to the purchase price of the seeds or bulbs.

NOTICE OF REQUIRED ARBITRATION

Under the seed laws of Indiana and some other states, arbitration is required as a precondition of maintaining certain legal actions, counterclaims, or defenses against a seller of seed. Information about this requirement, where applicable, may be obtained from a state's seed commissioner, commissioner of agriculture, or chief agricultural official.

2017 Biodiversity frost seeding
Red clover. B3, B6, B17

- 3 treatments * 4 plots/treatment = 12 Plots
 $100 \times 30 = 3000 \text{ sq ft} / 43560 = .0688 \text{ A}$
 $.0688 \text{ A} * 12 = .83 \text{ A}$

- 12 lbs/A red clover pure live seed.
 - seed has coating material so
 we need 20 lbs/A to get
 12 lbs/A pure live seed.

- Gandy = 15' wide 8 deflectors spaced 22.5"
 5 mph speed

- • 5 mph x 5280 = 26,400 ft/hr
 • 26400 ft/hr / 60 = 440 fpm
 • 440 fpm / 2 = 220 ft per 30 sec
 • 220 x 15 = 3300 sqft/30sec
 • 3300 sqft / 43560 = .07575 A in 30 sec
 • .07575 A 30sec / 8 deflectors = .00947 A per 1 deflector per 30 sec.

$$\text{gpm} = \frac{\text{grams/A} \times \text{mph} \times \text{width}_{\text{in}}}{5940}$$

- .00947 A x 20 lbs/A = .18939 lbs in 30 sec.

- .18939 lbs x 454 = 86 grams in 30 sec.

- calibration test

1 77 84 93 Avg 84.6 grams/30 sec.

- Double check $84.6 / 454 = .186 \div .00947 \text{ A} = 19.67$

- 30 lbs loaded in drill 1 lbs/A.