

Crop Rotations on Three Certified Organic Farms in Minnesota

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Abstract

So what is your organic crop rotation?

Crop rotation, the process of growing a sequence of plant species on a given piece of land over time, is the foundation of successful organic crop production.

Ask an organic farmer to define their crop rotation and sometimes you get a straight-forward answer. More often, however, the response is less straight-forward and a complex discussion ensues.

Case studies of the crop rotation histories from each field on three certified organic farms in Minnesota are examined over a five-year time span. In evaluating the cropping patterns on these three farms we can begin to understand the complexity of designing a crop rotation – in fact we see that perhaps it is a misnomer to refer to ‘a crop rotation’.

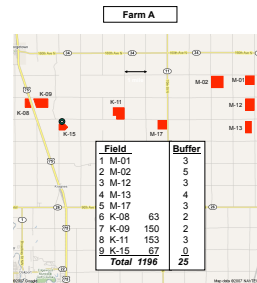
From the perspective of the accredited certification agency and the farmer, Farm A consists of 9 fields which range from 63 to 231 ac in size for a total of 1196 cropped acres, Farm B consists of 13 fields which range from 10 to 1396 ac in size for a total of 319 cropped acres, and Farm C consists of 1 field of 1.2 ac.

The two larger farms grows primarily corn, soybean, small grain and alfalfa as cash crops, whereas the smaller farm grows a large number of vegetable crops.

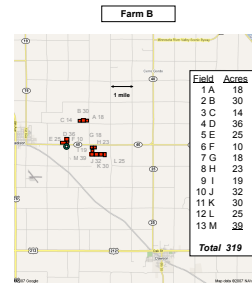
In evaluating the crops grown on these different fields over the past five years we realize that there is no distinct pattern of crop rotation common among the 9 fields of Farm A, the 13 fields of Farm B, or within the one field of Farm C.

It is difficult to easily describe ‘the rotation’ each of the three case study farms employs. Each uses a multitude of rotations based on the site specific nature of the fields within the farms.

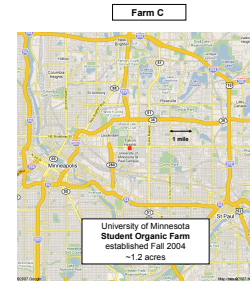
Fields Identified on each Farm



Global Organic Alliance (GOA)



International Certification Services (ICS)



MN Crop Improvement Association (MCIA)

Over a 5-year Period

So what was the organic crop rotation on each farm?

Farm A grew soybean on 36% of the acreage (on all 9 of 9 fields), alfalfa on 18%, and grasses on 35%, while 11% was fallow.

Farm B grew soybean on 25% of the acreage (on all 13 of 13 fields), alfalfa and pea on 30%, and grasses on 45%.

Thus, legumes were planted on just over 50% of the acreage on Farms A and B.

There was no distinct pattern of crop rotation common among the 9 fields of Farm A or the 13 fields of Farm B.

Farm C grew over 60 crops on 1.2 ac. About 1/2 was in vegetables, 1/4 in a perennial guild, and 1/4 in cover crops. A modified 8-year rotation – based on crop families – was initiated. Acreage planted to legumes was just under 50%.

Not surprising, legumes played a key role in the crops grown.



A visit to Cornercopia, the University of Minnesota Student Organic Farm.

For more details, see “Crop Rotations in Organic Production Systems” in Agronomy Monograph 54 ‘Organic Farming: The Ecological System’. Charles Francis (ed).

Crop Sequence and Acreage per Field over 5 Years

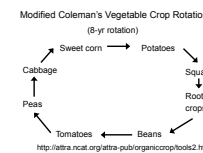
Field	Acres	2003	2004	2005	2006	2007
M-01	153	wheat	soy	soy	barley	barley
M-02	231	soy	wheat	soy	wheat	soy
M-12	150	alf	wheat	soy	whp	wheat
M-13	76	soy	wheat	bu	soy	barley
M-17	153	soy	corn	alf	alf	alf
K-08	63	fallow	soy	oat	soy	wheat
K-09	150	alf	alf	alf	corn	soy
K-11	153	wheat	soy	wheat	pearye	soy
K-15	67	popco	soy	oatrye	soy	fallow
Total	1196					

Crop	2003	2004	2005	2006	2007	Avg.	%
corn	67p	153	0	150	0	74	6
soybean	460	436	381	359	534	434	36
wheat	306	457	153	231	213	272	23
barley	0	0	0	0	229	46	4
oat	0	0	130	0	0	26	2
alfalfa	300	150	303	153	153	212	18
fallow	63	0	229	303	67	132	11
(buckwh)	0	0	229	0	0	46	(4)
(rye)	0	0	(296)	(153)	(229)	(136)	(11)
Total	1196	100					

Field	Acres	2003	2004	2005	2006	2007
1 A	18	oat	alf	alf	alf	alf
2 B	30	soy	wheat	bar&flax	flax&soy	pea
3 C	14	soy	wheat	flax	alf	alf
4 D	36	alf&soy	whit&alf	corn	soy&oat	
bar	soy					
5 E	25	corn	soy	oat/alf	corn	soy
6 F	10	corn	oat/alf	soy	corn	oat/c
7 G	18	alf	corn	soy	pea/c	corn
8 H	23	corn	soy	bar/alf	alf	alf
9 I	19	wheat/c	corn	soy	oat/alf	alf
10 J	32	corn&flax	soy	bar/alf	pea/c	corn
11 K	30	soy	corn	pea&alf	soy	
12 L	25	soy	oat/alf	alf	alf	alf
13 M	32	alf	alf	alf	corn&soy	flax
Total	319					

Crop	2003	2004	2005	2006	2007	Avg.	%
Oats	18	35	25	37	25	29	9
Soy	117	80	47	82	72	80	25
Alf	75	75	(35)	82	(96)	80	(19)
Corn	74	67	36	55	50	56	18
Wheat	19	62	0	0	0	16	5
Flax	16	0	29	15	19	16	5
Barley	0	0	85	0	33	24	7
Peas	0	0	15	50	39	21	6
Clover	0	(19)	0	0	(50)	(10)	(3)
Total	319	99					
Total cover crop	(16)						

Crops	Acres
cucumber	1
gourds	1
zucchini	1
peas	1
beans	1
Azuki bean	1
leeks	1
Brok choy	1
Fava bean	1
pepper	1
cauliflower	1
cut flowers	1
garlic	1
Kohlrabi	1
rhubarb	1
dandelion	1
beets	1
squash	1
carrot	1
garlic	1
parsnip	1
radish	1



Average Crop Acreage Per Field And Per Farm

Crop	5-yr avg.	%
corn	74	6
soybean	434	36
wheat	272	23
barley	46	4
oat	26	2
alfalfa	212	18
fallow	132	11
(buckwh)	(46)	(4)
(rye)	(136)	(11)
Total	1196	100

Crop	5-yr avg.	%
grasses	418	35
soybean	434	36
alfalfa	212	18
fallow	132	11
Total	1196	100

Crop	5-yr avg.	%
Oats	28	9
Soy	80	25
Alf	79	(36)
Corn	56	18
Wheat	16	5
Flax	16	5
Barley	24	7
Peas	21	5
Clover	(16)	(5)
Total	319	99
Total cover crop	(16)	

Crop	5-yr avg.	%
grasses	140	45
soybean	80	25
alfalfa	79	25
peas	16	5
fallow	0	0
Total	319	100

Crop	Acres
1/3 Perennial guild	1/4
1/3 Rye cover crop	1/3
1/3 Vegetables	6
[6 x 7 beds (4'x80')]	
Total	1.2

Crop	Acres
1/4 Perennial guild	1/4
1/4 Cover crops/chickens	1/4
2/4 Vegetables	2/4
[6 simplified family blocks (18'x80')]	
Total	1.2