



Susan Tallman

Organic Small Grain Production

Susan Tallman, CCA

ATTRA Resources

www.attra.org

1. Organic Small Grain Production publications

Overview – 10/15/11

Nutrient Management – 10/15/11

Weed Management – 9/30/11

Disease and Insect Management - Available

Farmer Profiles - Available

2. Videos and Webinars

Hinebauch Farm Tour

Boehm Farm Tour

Making Organic Small Grains Work on Your Farm



Susan Tallman



Definition

- ❑ Organic farming is the act of producing farming without use of synthetic fertilizers or pesticides and without the use of genetically modified seeds or products.
- ❑ A farmer must verify he has followed these practices for at least 36 months prior to his first organic harvest.
- ❑ To become certified, a farmer must file an organic system plan (OSP) with a certifying agency and have an annual on-farm inspection.

Regulations

Federal Code of Regulations, Title 7 Part 205, National Organic Program

- ▣ § 205.203 Soil fertility and crop nutrient management practice standard
- ▣ § 205.205 Crop rotation practice standard
- ▣ § 205.206 Crop pest, weed, and disease management practice standard

Production Acreage by State

STATE	ACREAGE
Colorado	60,339
North Dakota	54,685
Utah	54,213
California	46,223
Montana	44,579
Texas	34,176
Minnesota	28,861
Nebraska	26,217
South Dakota	23,087
Wyoming	21,079
US TOTAL	492,355



Marketing and Demand

- Organic Trade Association

www.ota.com

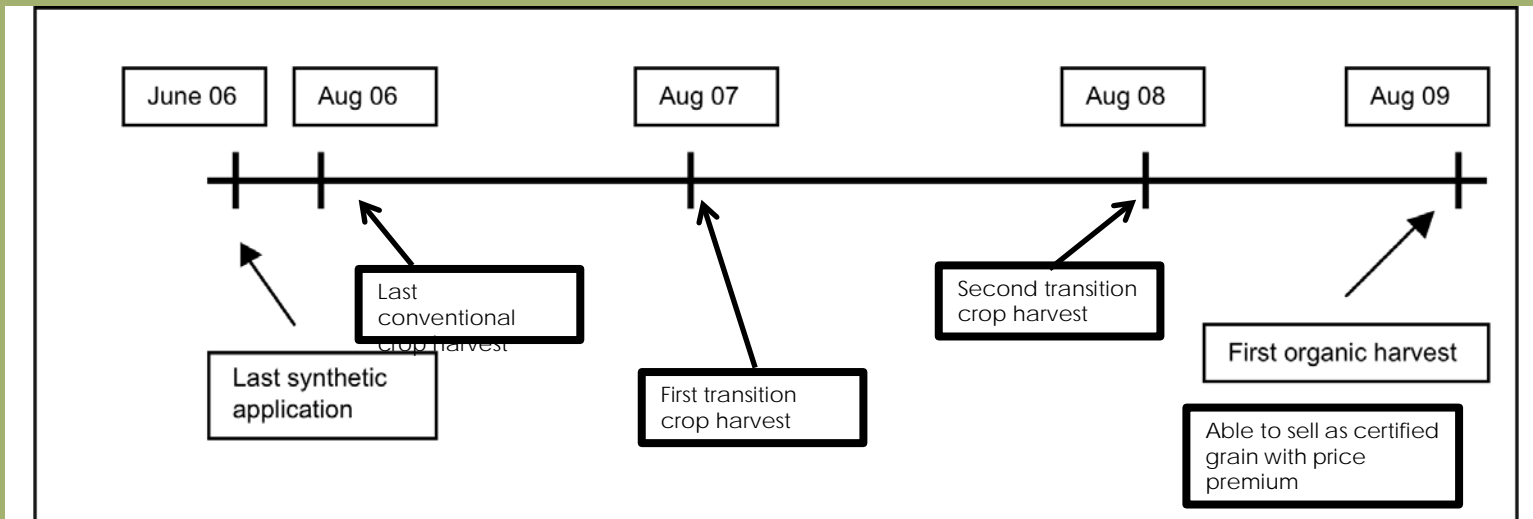
- MT Dept of Ag – historic prices, 2000 - 2008

www.agr.mt.gov/organic/spreadsheets.asp

- USDA Market news

www.ams.usda.gov/AMSV1.0/LSMarketNews

Transition

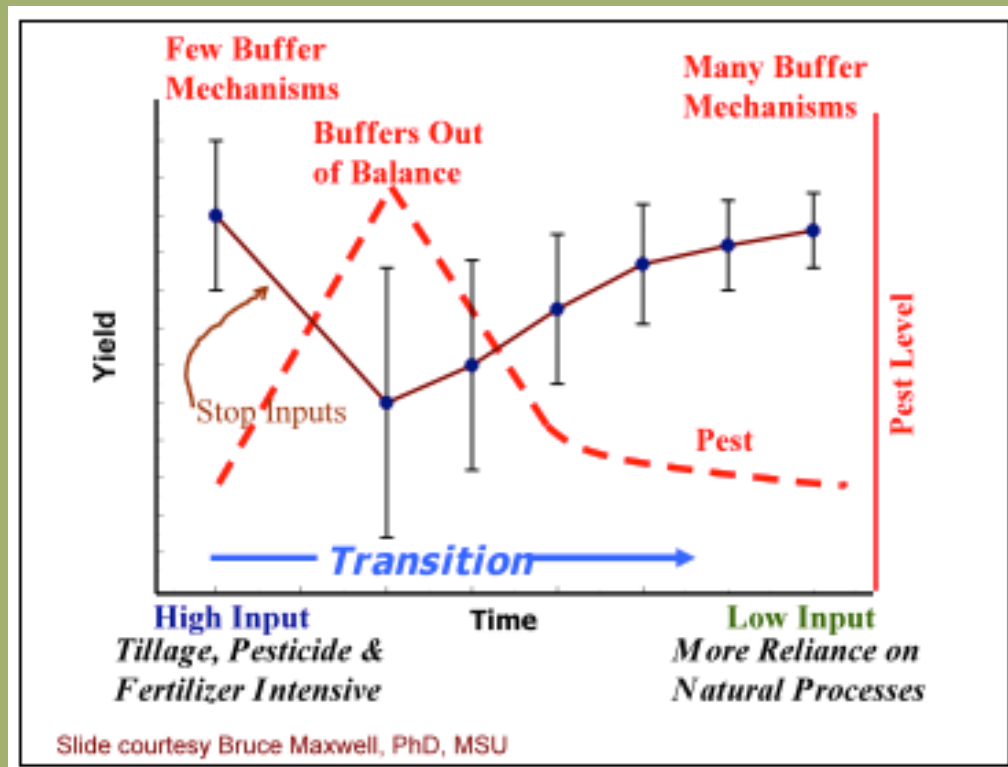


- ❑ 36 months from last application of prohibited substance
- ❑ Price premiums not available for transition crop
- ❑ Transition total acreage over 3 to 5 years

Yield Comparison

- Cornell University – 22-year study on yield differences in organic and conventional corn and soybeans found that yield dropped by a third during the transition, but then recovered after the transition
- Iowa State University– organic corn yielded 98% and soybean yielded 91% compared with conventional in the first year of transition
- Montana State University – 4-year study showed similar yields of organic and conventional winter wheat

Yield During Transition



CRP and Organic



Joe Carleton, NRCS

- ❑ Can be certified right away if farmer can provide proof of no prohibited substances in the past 36 months
- ❑ Not recommended due to low nutrient availability
- ❑ Minimum 2 years of tillage and cover crops before ready for a cash crop



Nutrient Management

§205.203 Soil Fertility and Crop Nutrient standard

Allowed	Not Allowed
Manure	Sewage sludge
Compost	Any synthetic or biological substance not on National List (§205.600 - 607)
Anything on National List (§205.600 - 607)	
Mined substance of low solubility (rock phosphate)	
Mined substance of high solubility with provisions (KCl)	
Green manure cover crops	

Manure Standards

- ❑ Does not need to be composted or incorporated if applied to a crop not for human consumption
- ❑ Must be incorporated 90 days prior to harvest for crop that does not contact the soil
- ❑ Must be incorporated 120 days prior to harvest for crop that does contact the soil



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Compost Standards

- Initial C:N ratio between 25:1 and 40:1
- Temperature between 131F and 170F for 3 days in-vessel or static aerated pile
- Temperature between 131F and 170F for 15 days in windrow system, with a minimum of 5 turns



Nitrogen Sources

- ▣ Green manure cover crops
- ▣ Manure and compost
- ▣ Sodium nitrate



Yellow Blossom Sweet Clover

Susan Tallman

Cover crops



Spring Pea
Susan Tallman

- ▣ More difficult to estimate the N benefit, due to rainfall variation
- ▣ Timing of termination is critical.
- ▣ Full bloom for maximum N. Earlier to minimize water loss.
- ▣ June 15th FSA termination date to qualify as fallow.
- ▣ Annuals vs. perennials
- ▣ How to estimate N? Count biomass.

Nutrient budget example

Nitrogen Budget for Organic Corn,
Vermillion, South Dakota

ORIGINAL ROTATION

Soil Organic Matter (3.5 x 12)	42
Manure (2T/acre)	14
Compost	0
Cover Crop (Berseem clover)	40
TOTAL N CREDITS	96
CROP NEEDS	(160)
NET	(64)

Nutrient budget example, cont.

Nitrogen Budget for Organic Corn,
Vermillion, South Dakota

RECOMMENDED ROTATION

Soil Organic Matter (3.5 x 12)	42
Manure (3T/acre)	21
Compost	0
Cover Crop (3 rd year alfalfa)	100
TOTAL N CREDITS	163
CROP NEEDS	(160)
NET	3

Phosphorus

Over time, phosphorus may be the most limiting nutrient. Organic phosphorus fertilizers are expensive, with low availability, and manure is not always available.

- ▣ Manure
- ▣ Rock phosphate (0-3-0)
- ▣ Bone meal (4-14-0)

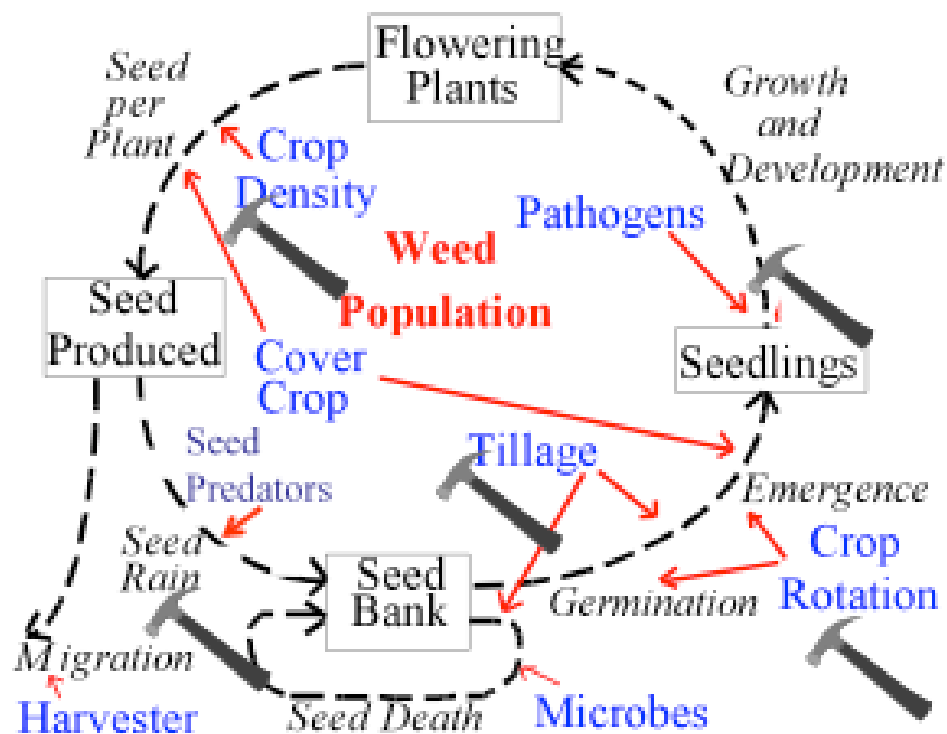
Potassium

- ❑ KCl (0-0-60) – high solubility. Can be used with restrictions. Cannot cause Cl accumulation in the soil.
- ❑ Sulfate of Potash (0-0-50-18) – low solubility. Can be used without restrictions.
- ❑ Sul-Po-Mag (0-0-22-23) – low solubility. Can be used without restrictions.
- ❑ Manure and compost

Other nutrients

- ▣ Elemental sulfur – allowed synthetic with no restrictions
- ▣ Liming agents - Only mined forms are allowed, not altered or fired forms
 - ▣ Calcitic lime (CaCO_3)
 - ▣ Dolomitic lime ($\text{CaMg}(\text{CO}_3)_2$)
 - ▣ Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)

Weed Management Many Little Hammers



Slide courtesy Bruce Maxwell, PhD, MSU

Field examples



Organic Rye, North Dakota

Susan Tallman

Field examples



Organic Spring Wheat, North Dakota

Susan Tallman

Weed Control Hierarchy

§205.206 Crop pest, weed, and disease management practice standard



Weeds

- ❑ Sanitation, Rotation
- ❑ Variety
- ❑ Seed Density and Size
- ❑ Cover crops – Hay, Graze
- ❑ Tillage
- ❑ Flaming vs. Burning
- ❑ Organic Herbicides – EPM Database at ATTRA



Dr. Fabian Menalled

Canada Thistle example

- ❑ Plant field with alfalfa for competition
- ❑ Haying helps to knock it back
- ❑ Flame patches at 3 to 4 leaf stage
- ❑ Graze patches with sheep



Canada Thistle in Organic Oats

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Roller crimper

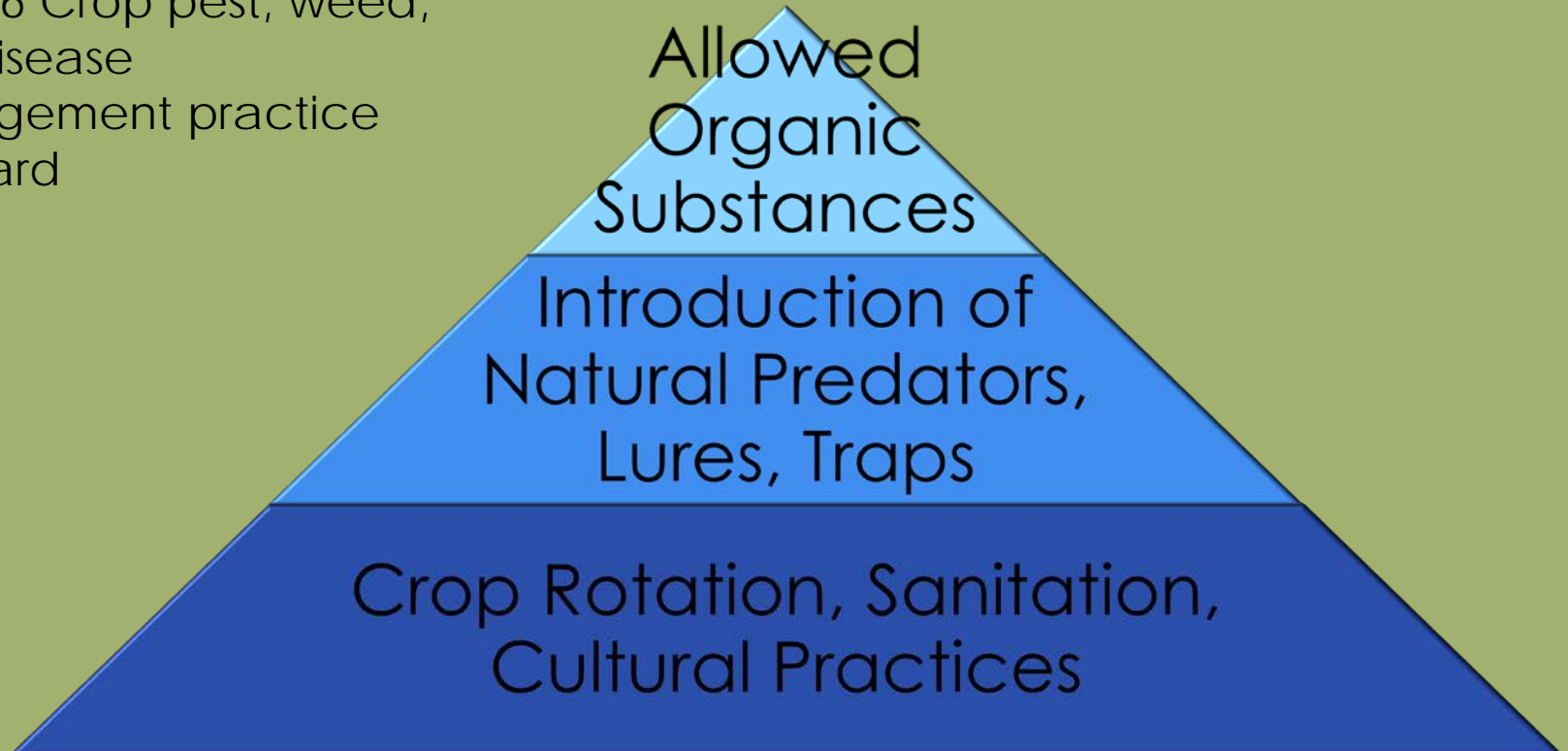
- ❑ Timing
 - ❑ Grass – pollen shed
 - ❑ Legume – flowering
 - ❑ Pressure - enough to crush stems without cutting them
 - ❑ Initial success planting soybeans into rye cover crop
- ❑ A continuous no-till organic system has not been perfected, but work is being done to develop partial no-till organic systems
- ❑ Dr. Pat Carr at NDSU, Jeff Moyer at Rodale



Roller Crimper in Organic Rye
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Disease and Insect Control Hierarchy

205.206 Crop pest, weed,
and disease
management practice
standard



Disease Management

- ▣ Prevention
- ▣ Variety selection
- ▣ Diverse rotation
- ▣ Mow to prevent spread of ergot
- ▣ Seed borne diseases – smut and bunt
- ▣ Organic Materials Review Institute www.omri.org
- ▣ ATTRA Biorationals Database www.attra.org

Insect Management

- ❑ Hierarchy – prevention
- ❑ In crop examples – RWA, grasshopper, WSS
- ❑ Storage examples
 - ❑ Temperature
 - ❑ Sanitation
 - ❑ Beneficial insects
 - ❑ Diatomaceous earth

Biorationals: Ecological Pest Management Database

[Pest Prevention Information ->](#)

Your search for: "**Damping Off**" has produced 26 results.

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Trade Name	Active Ingredient	Supplier (mouse over for details)	Labels	OMRI Listed
Actino-Iron	Streptomyces lydicus	Natural Industries, Inc.	Label 1	No
Actinovate	Streptomyces lydicus	Natural Industries, Inc.	Label 1	Yes
Agroneem	Azadirachtin	Agro Logistic Systems	Label 1	Yes
Binab	Trichoderma viridi	Binab Bio-Innovation AB		No
Companion	Bacillus Subtilis GB03	Growth Products, Ltd.	Label 1	No
HiStick N/T	Bacillus Subtilis MBI 600	Becker Underwood, Inc.	Label 1	No
Kodiak Concentrate	Bacillus Subtilis GB03	Bayer CropScience	Label 1	Yes
Kodiak Flowable	Bacillus Subtilis GB03	Bayer CropScience	Label 1	No
Kumulus	Sulfur	MicroFlo Company	Label 1 Label 2	Yes
MilStop	Potassium bicarbonate	BioWorks, Inc.	Label 1	Yes



Crop Rotation

§205.205 Crop rotation practice standard

The producer must include sod, cover crops, green manure, and catch crops that provide the following, as applicable:

- ❑ Maintain or improve soil organic matter content
- ❑ Provide for pest management
- ❑ Manage deficient or excess nutrients
- ❑ Provide erosion control

Soil Organic Matter

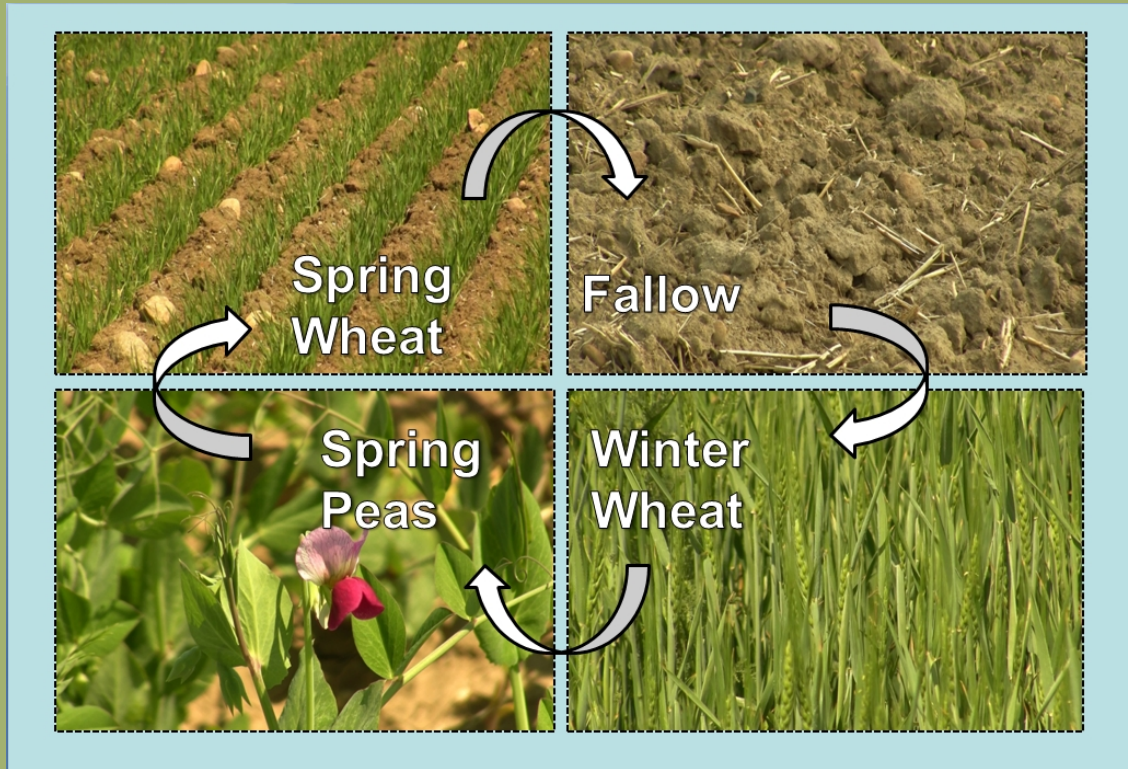
Management Practice	Gains Increase	Losses Decrease
Add materials from outside the field	Yes	No
Better utilize crop residue	Yes	No
Include high-residue crops in the rotation	Yes	No
Include sod crops	Yes	Yes
Grow cover crops	Yes	Yes
Reduce tillage intensity	Yes/No	Yes
Conservation practices to reduce erosion	Yes/No	Yes

Dr. John Gilmour, 2009

Other Considerations

- ▣ Flexibility
- ▣ Water use
- ▣ Diversity
- ▣ Livestock integration

Sample Rotations



Randy Hinebauch, Chinook, MT

Avg. pcp. 13"

Sample Rotations

Location	Annual Pcp. (inches)	Rotation
Ft. Benton, MT	14	cash crop – green manure
Madison, MN	18 – 24	corn – soybeans – wheat – alfalfa - alfalfa
Jennings, KS	18	wwheat – fallow – milo – sweet clover – alfalfa – forage crop
Wooster, OH	38	Corn – soybeans – wwheat – red clover

Further Resources

Susan Tallman, CCA
513 North Black Ave
Bozeman, MT 59715
sustallman@hotmail.com
406-587-3977

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www.attra.org