

# Managing Annual Ryegrass as a Cover Crop

Michael Plumer  
Natural Resources Management

 College of Agricultural, Consumer and Environmental Sciences  
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

## Reasons to Use Cover Crops

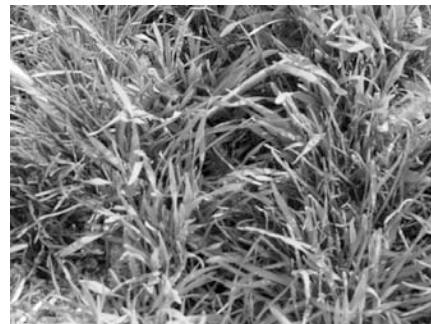
- Improved soil tilth
- Increase Organic Matter
- Increase soil biological activity
- Improve soil structure
- Increase soil moisture holding capacity
- Add nitrogen
- Cycle nutrients



## Annual Ryegrass

- Winter annual forage grass
- Used as a lawn grass for new lawns
  - Easy to establish
  - Quick greenup
- Used as summer and winter forage
- Used in critical area seedings for quick cover

## What does it look like?



## Growth Characteristics

- Winter annual
  - Planted in fall
  - Grows all winter
  - Matures in May
  - Dies in June
- Biennial- can act like one but isn't
  - Planted in spring
  - Grows vegetatively all year
  - Matures following spring

## Uses of Annual ryegrass as a mulch



## Ryegrass benefits

- Small ryegrass decomposes readily
- provides mulch/weed control
- works for most crops
- easy to establish broadcast
- good root mass, adds SOM, adds tilth
- reasonable cost \$0.40 to \$0.65/ lb.
- Tolerates wet soil
- Stores excess nitrogen (can uptake 300-500#/a)
- Excellent livestock feed value

## Residue Quality

Common index (C:N)

Residue < 20 C:N decompose fast >N levels

young ryegrass C:N 12:1  
(depends on N available)

C:N >30 decreases N available in soil

Soybeans 15-25:1  
Corn 30:1

Corn stalks 60:1  
Wheat straw 80:1



Example of picking up excess nitrogen after corn



## Nitrogen Uptake

Example of holding Nitrogen



- Corn after Corn
- 200#/a = 215 bu/A.
- Jan 7th = 3642 #/A. annual ryegrass
- 2" of water leached  
84 #/a of available Nitrogen from ryegrass

## Ryegrass Management

- Plant dates
- Seeding rates 8-25#/a
- Spring kill before grass joints for quick decomposition
  - Use tillage or plastic to smother
- Ryegrass can retiler/resprout if not killed
- Combine with grazing system
  - Will reduce rooting
  - Make plant easier to control

## Ryegrass

- Seeding method
  - broadcast after harvest
  - drilled
  - does best if September seeded
  - Aerial seeded early September
- Seeding rate
  - broadcast 15-20 #/acre
  - drilled 8 – 15 #/acre

## Date of Planting

- South I-70 seed before Oct. 15<sup>th</sup>
- North of I-70 seed before Oct. 1
- Dormant seeding
  - December – March 1
- Later seeding requires addition of:
  - Manure
  - 30-50#/a of nitrogen
 To improve stand/ survivability



Seeding annual ryegrass with rolling harrow

## Date of Planting



Ryegrass September 15 seeded vs mid October ....11" vs 2" on Nov 4th



Seeded Sept 15  
on Sept. 30<sup>th</sup>

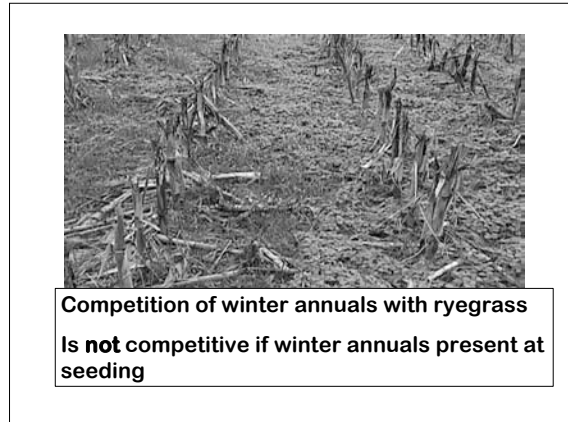
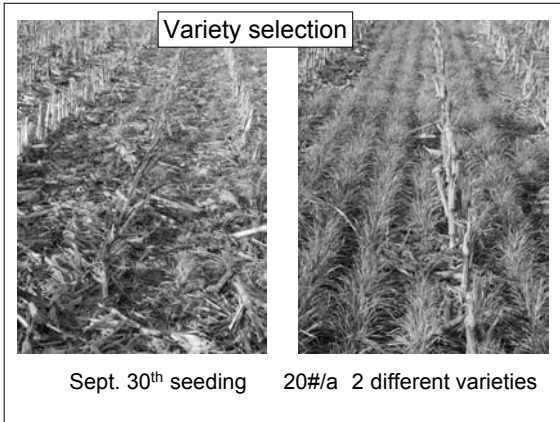


13#/a  
seeding

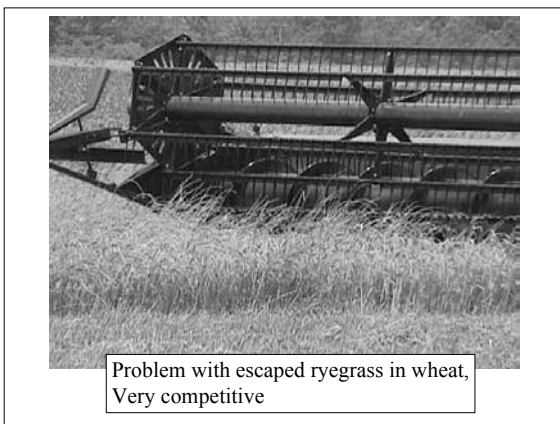
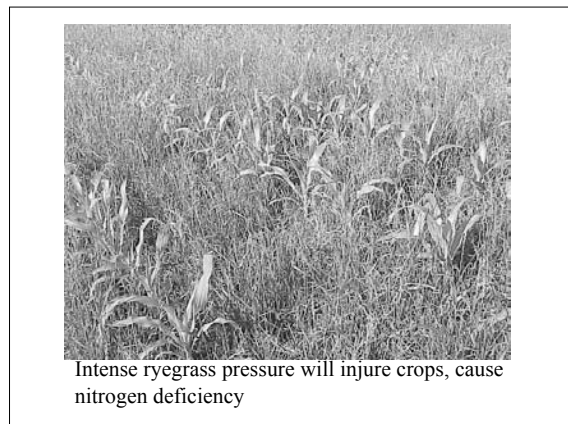
Sept. 15 seeded as of Jan. 6<sup>th</sup>  
12+” height and 3642# dry matter/acre  
Roots to 20”

## Grazing value from Jan. 6<sup>th</sup> test

- 21 % Protein level
  - This level can be higher if excess nitrogen is found in soil
  - In heavy manure applications, excess nitrogen raised protein level to 28%
- Relative feed value of 191
  - Better than corn or alfalfa



- ### Annual Ryegrass Control
- Tillage very effective
  - Mowing after bloom/before complete seed development
    - Variable success
    - Some seed may be produced
  - Plastic mulch smothered
    - Smaller easier to control
    - Has fumigant qualities on root knot nematode
      - Others?



## Rooting Depth

- – December 10<sup>th</sup> ryegrass roots 14"
- April 9<sup>th</sup> to 51"
- Corn roots on Claypan soil
  - September 4<sup>th</sup> to 75"
- Soybean roots on Claypan soil
  - September 4<sup>th</sup> to 48"



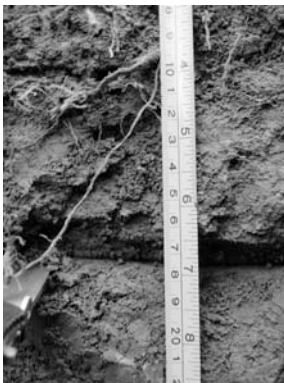
April 9 in silt loam soil



Roots April 9<sup>th</sup> at 12" depth; third year of ryegrass cover  
Note soil structure and worm holes



Corn root mass in silt loam clay pan soil under vetch/ryegrass cover crop



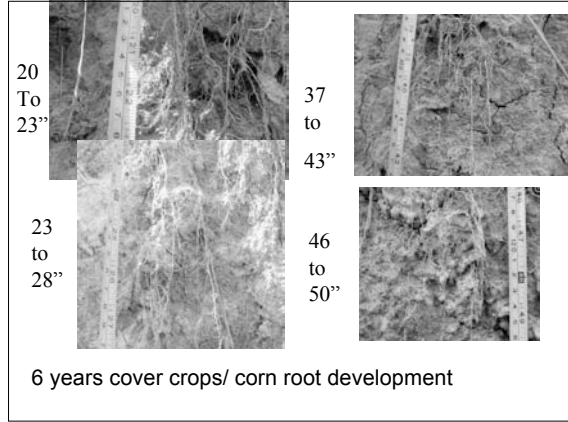
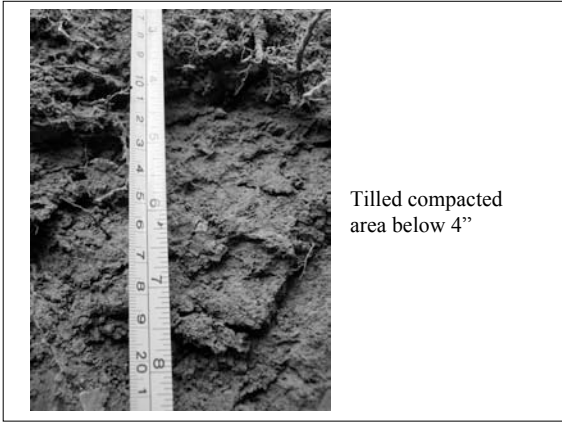
Intensive tillage can destroy soil structure

tilled soil with a line of compaction at 7"

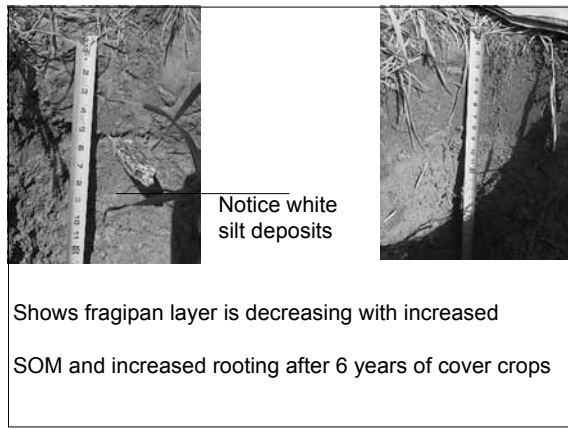


Note root growth restricted to 4 1/2" in chisel disk system

Note compacted platy soil below 5"



- ### Soil profile changes
- Noted movement down of topsoil depth and color (organic matter)
  - Noted significant decrease in silt fragipan deposition layer after 3 years !!!!!
  - Significant increase in subsoil root –allows for crop root expansion



### Cover crop rooting depth compared

Cereal rye	18.4"
Annual ryegrass	30.6" *

first year cover crop, planted Oct. 1  
roots measured April 9th

\* Significant .05

### Soil Density all no-tilled 9+ years

	Ryegrass cover crop 7 years	No cover crop
10"	1.49 g/cc	1.66 g/cc
16"	1.58	1.54
24"	1.48	1.65

## Soybean Yield

	Bare	Cereal Rye	Ryegrass
Sw	48.2	52.3	60.6*
NW	51.2	53.8	55.7*

3 replications, each location  
\* Significant .05

## Nematode Properties

- Research shows nematode suppression
  - Strawberries < root knot nematodes- MAFRA
  - Incorporation reduces soybean cyst nematodes --Rigor, Welacky, Anderson

## Nematode suppression

**Table 2.** Effect of root exudates originating from different plant species, on hatching of *Heterodera glycines* eggs.

	Egg hatching (%)
<i>Echinochloa crusgalli</i>	17.9±1.3*
<i>Glycine max</i>	31.3±3.9*
<i>Lespedeza capitata</i>	22.9±1.4*
<b><i>Lolium multiflorum</i></b>	<b>46.6±3.1*†</b>
<i>Lupinus perennis</i>	16.9±1.8*
<i>Medicago sativa</i>	19.9±2.7*
<i>Melilotus officinalis</i>	18.7±1.8*
<i>Trifolium hybridum</i>	24.9±1.9*
<i>Trifolium repens</i>	37.8±2.1*†
<i>Vicia villosa</i>	19.0±1.7*
Control water (perlite)	7.3±1.2

Anderson, Welacky, Rigor Can. J. of Plant Pathology

## Nematode suppression

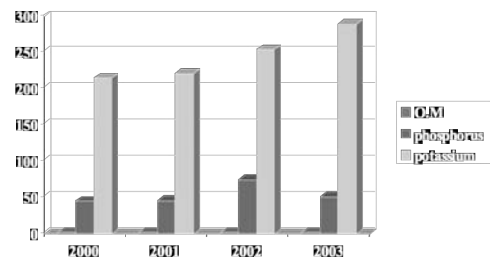
**Table 1.** Effect of plant residues incorporated into soil on *Heterodera glycines* numbers in soil and roots of greenhouse grown soybeans.

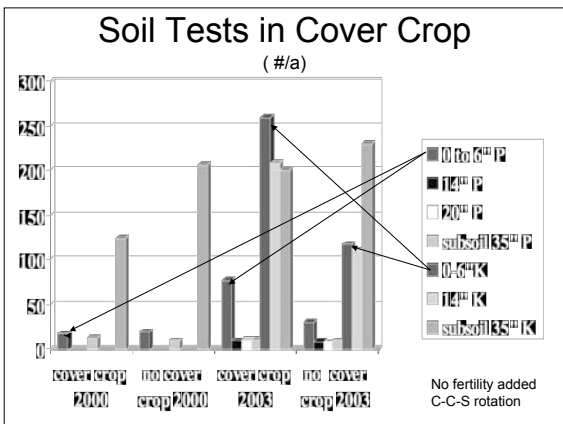
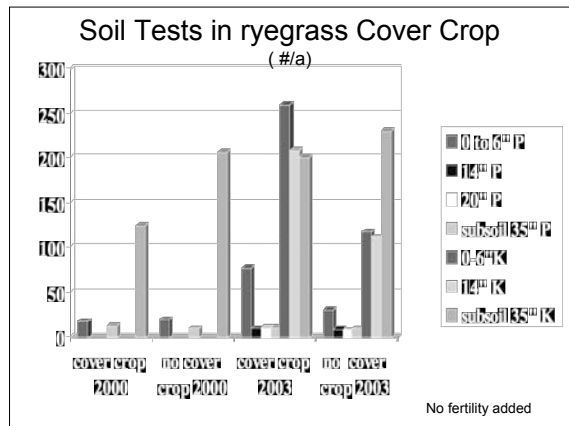
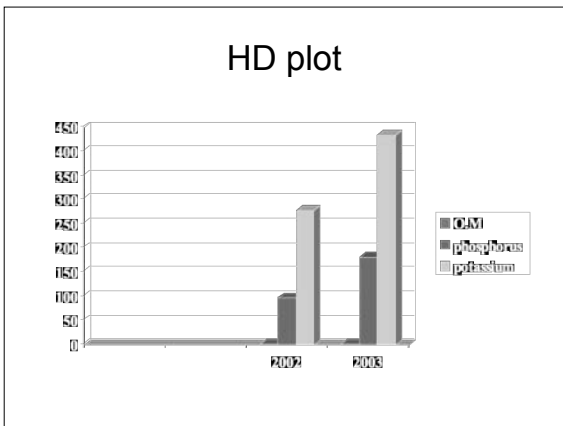
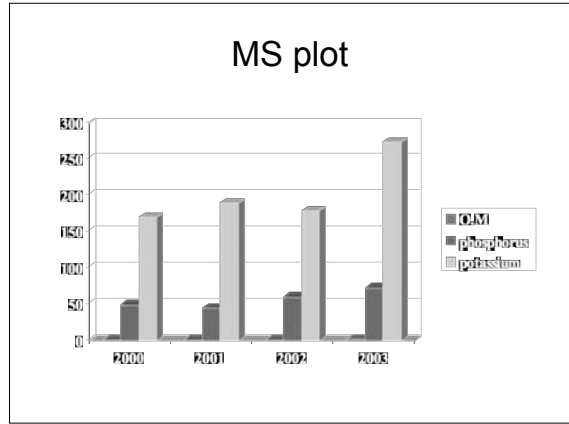
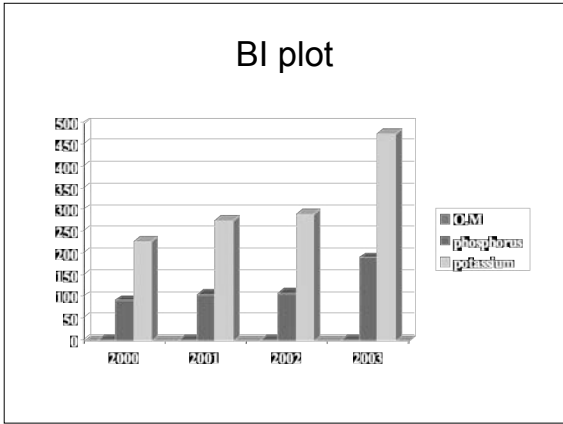
Common name	Nematodes/g soil	Nematodes/g root
<i>Avena sativa</i> L.	1.69±0.31 (17)	6.19±1.71* (13)
<i>Brassica juncea</i> (L.) Czara	9.78±0.06 (24)	18.97±4.02 (20)
<i>Brassica napus</i> L. var. napus	2.36±0.52 (19)	2.98±1.03* (10)
<i>Desmodium canadense</i> (L.) DC.	0.87±0.14 (12)	16.01±2.87 (19)
<i>Echinochloa crusgalli</i> (L.) Beauv. var. <i>frutescens</i> (Roth.) Link	2.16±0.39 (18)	1.95±0.28* (6)
—	Fairway B Lawgrass mixture	0.41±0.04* (5)
—	French-Sardel bushclover	0.42±0.06* (7)
—	Hairy bushclover	0.51±0.07* (8)
—	Roundleafed clover	0.41±0.04* (5)
—	Annual ryegrass cv. Common No. 1	0.28±0.04* (2)
—	Perennial ryegrass	0.39±0.09* (4)
—	Perennial lupine	0.75±0.17* (11)
—	Alfalfa cv. Apollo Supreme	0.31±0.11* (3)
—	Yellow sweet clover	0.25±0.08* (1)
—	Field peas	0.62±0.08* (10)
—	Oilseed radish	3.48±0.72 (21)
—	Alake clover	1.39±0.43 (15)
—	Red clover cv. Double Cut	0.41±0.09* (6)
—	White clover cv. Ladino	0.93±0.23 (13)
—	Soft wheat cv. Freedom	9.24±3.02 (22)
—	Hairy vetch	7.83±2.36 (22)
—	Soybean cv. Elan 87	1.47±0.11 (16)
—	Soybean cv. Elan 87	24.41±2.76 (23)
—	Soybean cv. Elan 87	1.09±0.18 (14)
—	Soybean cv. Elan 87	29.43±3.11 (24)

## Soil Fertility Changes

- Take good samples
- Keep good records of changes
- Cover crops can pull fertility from subsoil
- Sample same time and moisture content

## TA plot





- ### Ryegrass Fertility Impacts
- Cover crops can move nutrients
    - From subsoil to surface
    - Will decrease subsoil levels
  - Increased SOM will store nutrients
  - Cove crop can store nitrogen for later release
  - Cover crop can tie up nutrients if allowed to mature



## Ryegrass

- Provides specific benefits
  - Requires high level of management
  - Can be highly beneficial
- **All cover crops are weeds in Growing Crops**
- Manage accordingly



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