



# Attributes of Cover Crops



**Anne Verhallen**  
**Soil Management Specialist**





# Or the Cover Crop - So What?



## What Ontario Growers said about cover crops...

### Why they cover crop...

- Erosion control
- Nitrogen credits
- Feed
- Tie up nutrients
- Green manure
- Structure
- Improved drainage
- Breakdown and condition wheat stubble
- Improved rooting
- Diversity
- Crop management without pesticides
- Crop rotation
- Traction in wetter fields



## Reduce Soil Erosion

### Water and Wind Erosion – What is it worth?

- Nutrients in wind blown soil - \$1 to \$10 /acre
  - Can cut yield 50%
  - Need 2-3 tons/acre residue for effective control
  - Water Erosion - \$40/acre value in eroded sediment
- (soil loss/nutrient loss/ road and ditch maintenance included in formulating value)

**Monday June 9, 2008 – Kent County**



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Barley – spring seeded 1.5  
to 2 bushels per acre



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# Lots of options for erosion protection



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# Lots of options for erosion protection



**Cereal rye windstrips for tomatoes – Leamington, Ontario**



**Or over the whole field**





**Lots of options for  
erosion protection**



***Alfalfa after seed corn  
And the added bonus  
of nitrogen***

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## N- Scavenger / N- Fixer



# Typical Range of Cover Crop Biomass Production

Cover Crop	Dry Matter Produced lbs/ac
Red clover (plow-down)	2,403-4005
Oats	890-4895
Rye	890-3560
Oilseed Radish	1780 - 6675



Weather related variations from year to year

## Oilseed Radish (avg 2 reps)

5000 lbs/ac Oilseed Radish tops at 4.6%N = 230 lbs N/ac

3800 lbs/ac Oilseed Radish roots at 2.3%N = 87 lbs N/ac

Total N uptake

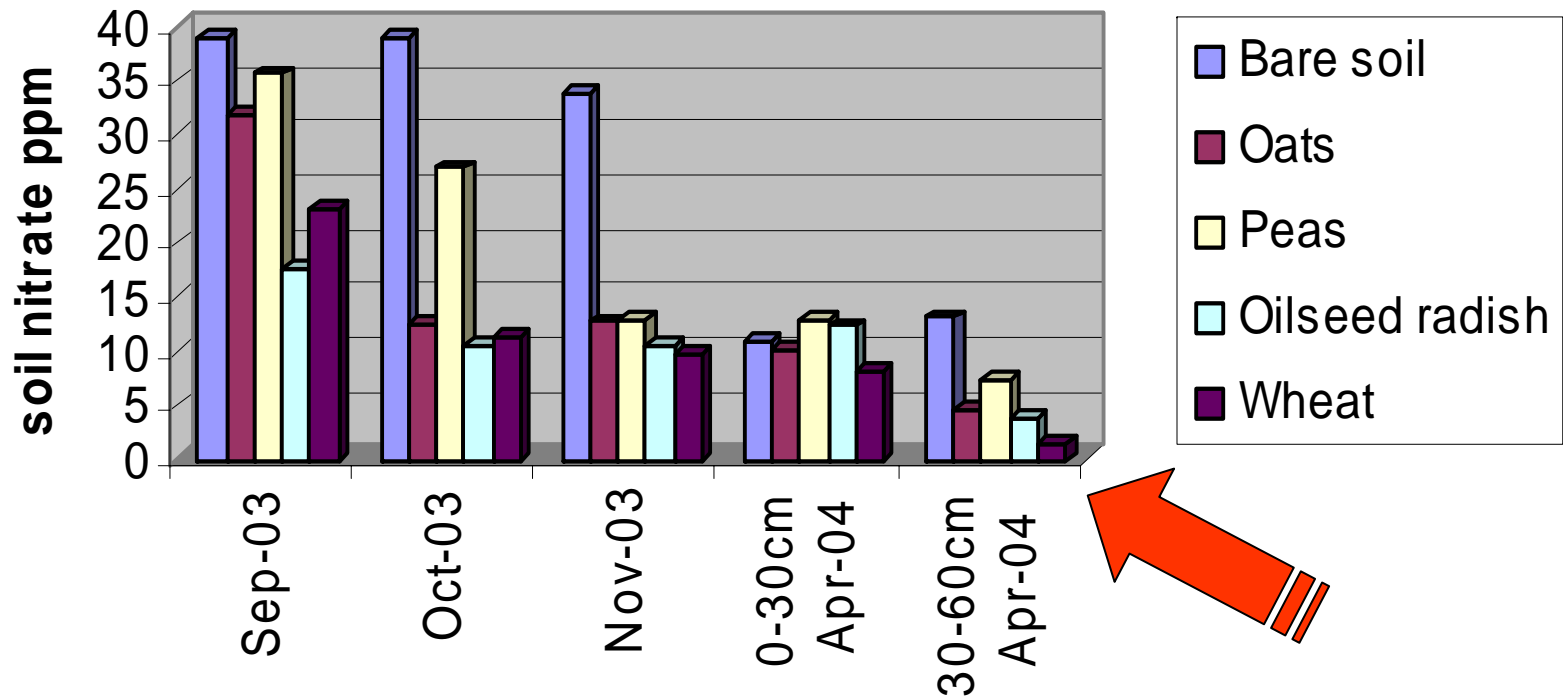
**317** lbs N/ac

Horticulture Green House Gas Project 2003: Source: A Verhallen, Ridgetown



# How well do they capture N?

## Soil Nitrate Levels under Cover Crops (planted Aug.15, 2003 after cucumbers)





**Bare**

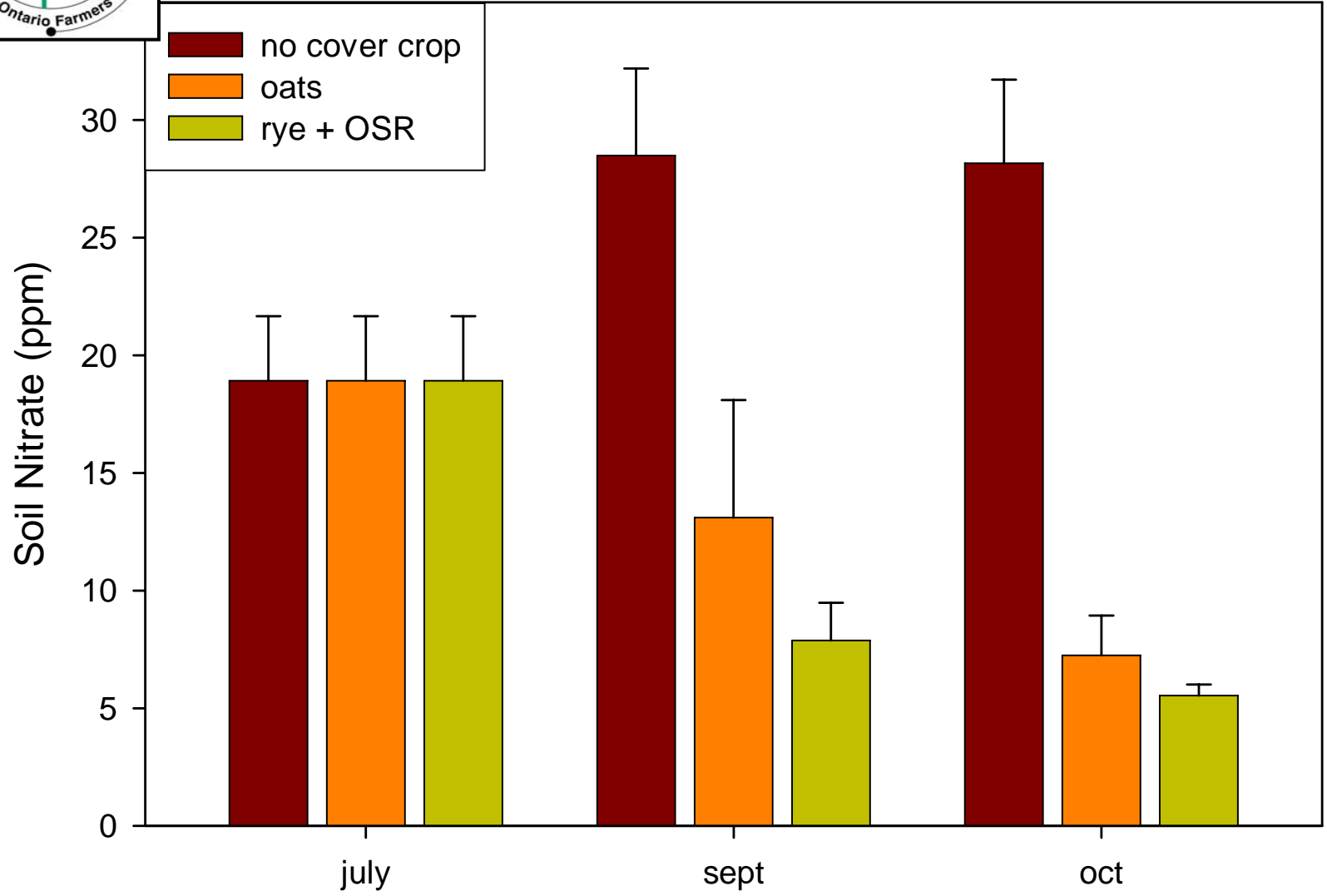
**Rye /  
Oilseed  
Radish**

**Oats**





# Cover Crops: Soil N



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Soil Sample Date

# Nitrogen Availability – C:N ratio



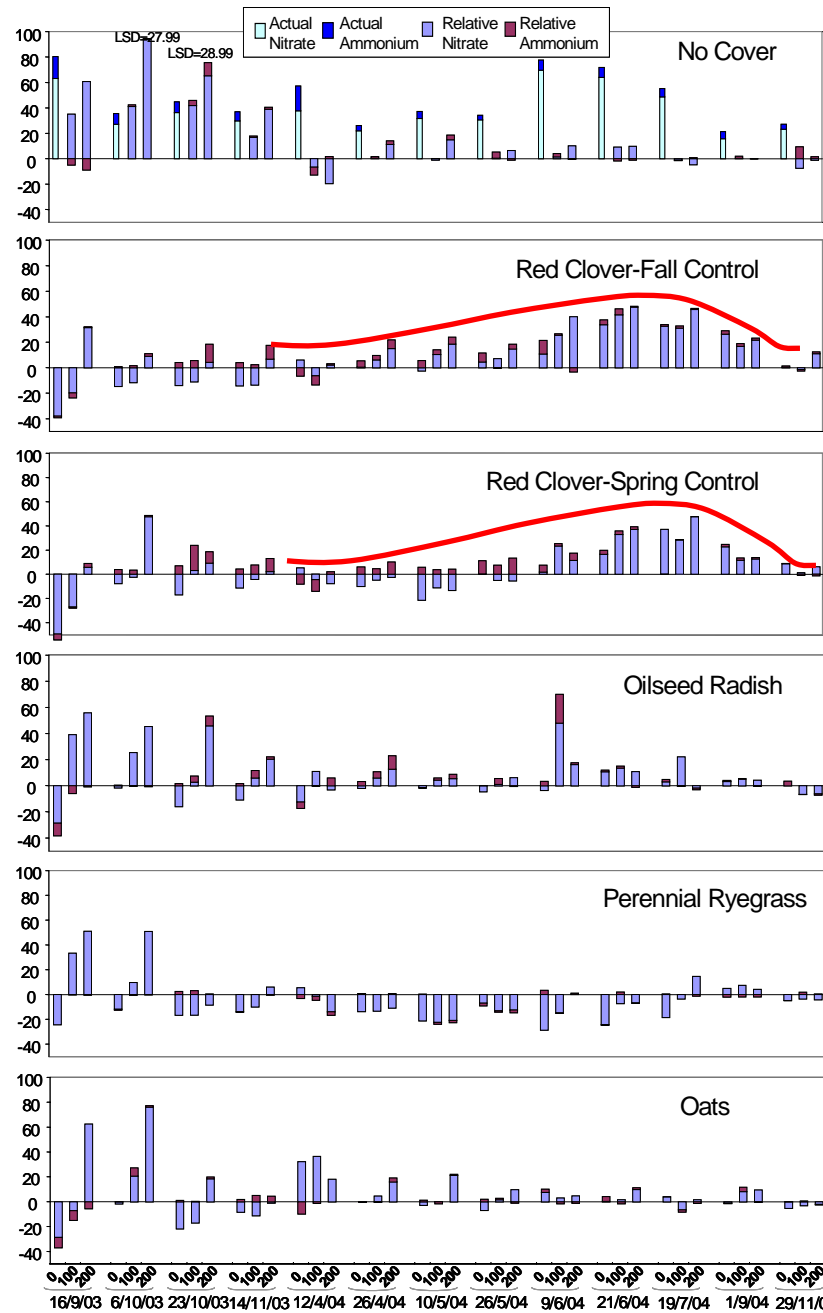
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Timing of Kill

and

Timing of N Release



No Cover

Red Clover Fall Control

Red Clover Spring Control

Oilseed Radish

Perennial Ryegrass

Oats

Mid Sept 03

mid Nov 04

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From work by W. Deen, University of Guelph

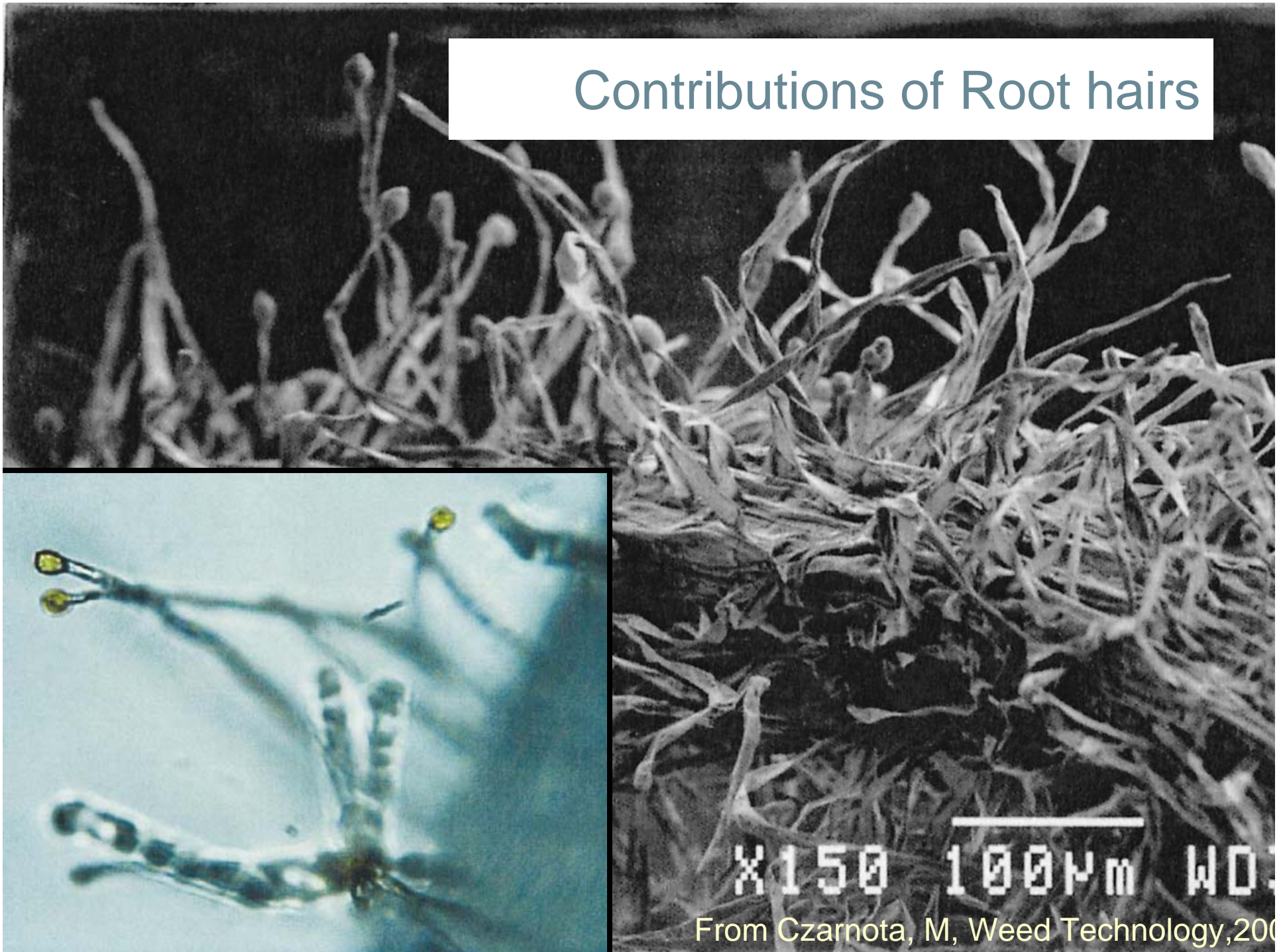


## Adds organic materials to the soil

- soil structure
- water holding capacity
- organic matter maintenance
- soil fauna



# Contributions of Root hairs






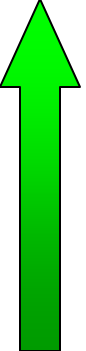
## Cover Crops as a Soil Builder – Can Cover Crops Build Organic Matter?

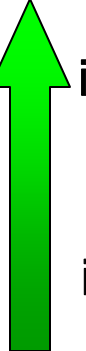


- Illinois study 1996 – a vetch/rye cover crop and chemical burn down in snap beans – in 3 yrs soil organic matter went from 3.07 to 3.48%



## Improved Water Holding Capacity

0.5 %  in soil OM = 15%  in nutrient holding ability  
(ie K, Mg)

12 %  in water holding capacity

(result possibly one week longer drought-stress free symptoms  
on a sandy loam soil with low OM)



# One week longer drought-free stress What's it worth?

**4 consecutive days of visible wilting can reduce potential corn yield:**

Table 1. **Effects of Drought on Corn Yield**

<u>Stage of Development</u>	<u>Yield Reduction</u>
Early vegetative	5 - 10 %
Tassel emergence	10 - 25 %
Silk emergence, pollen shedding	40 - 50 %
Blister	30 - 40 %
Dough	20 - 30 %

Source: Classen, M.M , and R.H.. Shaw. 197C.  
Water deficit effects on corn. II.  
Grain components Agron J 62:652-655.





## Reduce pest populations

- Weeds
- Nematodes
- Insects
- Disease



Corn

OSR

Pea

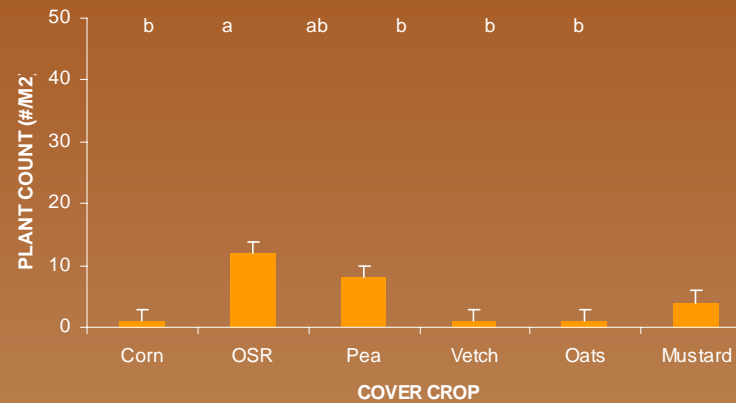
Vetch

Oats

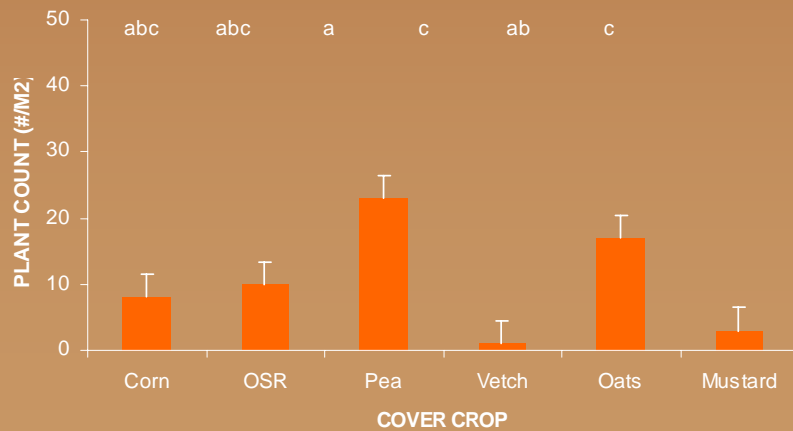
Mustard

# Impact on Weed Populations

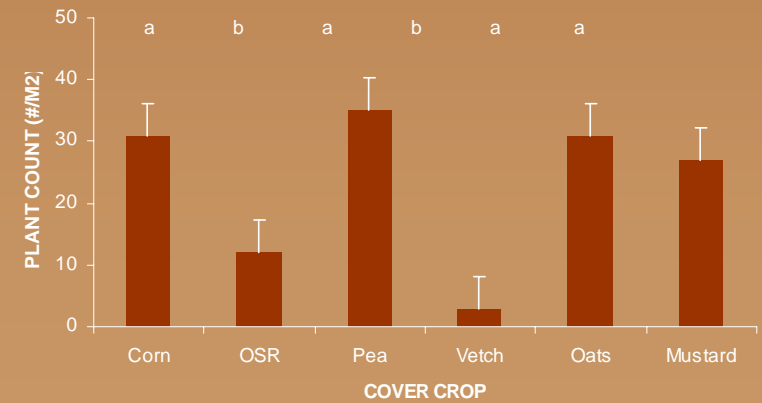
## Eastern Black Nightshade



## Redroot pigweed

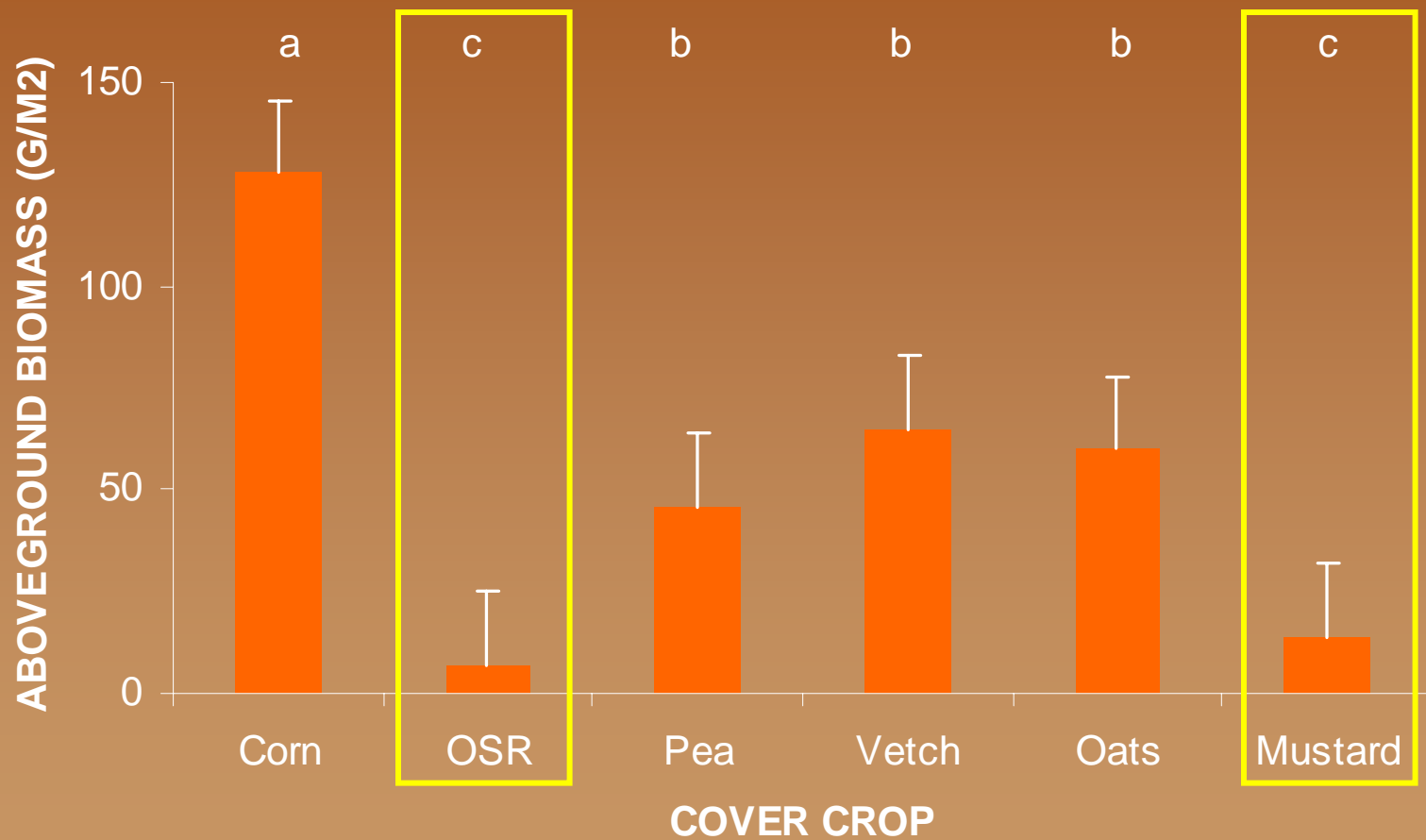


## Chickweed





# Total Weed biomass



Robinson, Van Eerd – Ridgetown Campus



## Weed Biomass Summary

- Oilseed radish and mustard gave best suppression of weeds present in the study.
- Though weed counts were low for each weed species, redroot pigweed and volunteer wheat produced large plants in the vetch treatment.
- Corn, pea and oat cover crops had the highest weed biomass and counts.



# Nematode Suppressing Cover Crops in Ontario:



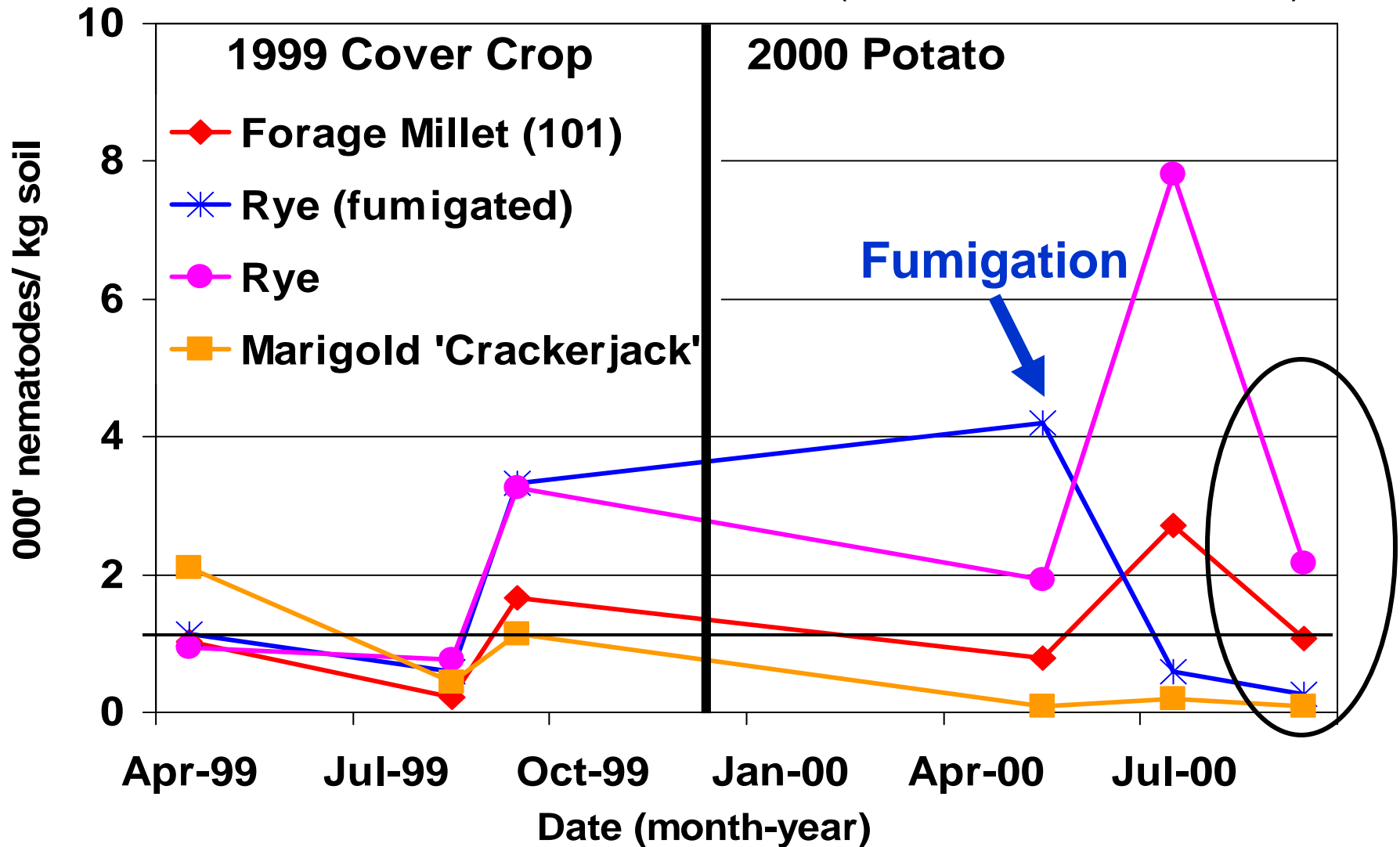
- **Canadian Forage Pearl Millet 101**
- **Sudan grass x sorghum cv Sordan 79, Trudan 8**
- **Marigold sp. - ‘Crackerjack’ and ‘Creole’**
- **Oilseed radish - ‘Adagio’ and ‘Kernel’**
- **Brassica sp. - certain hot mustard varieties such as Cutlass**
- **Brown and Black-eyed susan (*Rudbeckia*)**



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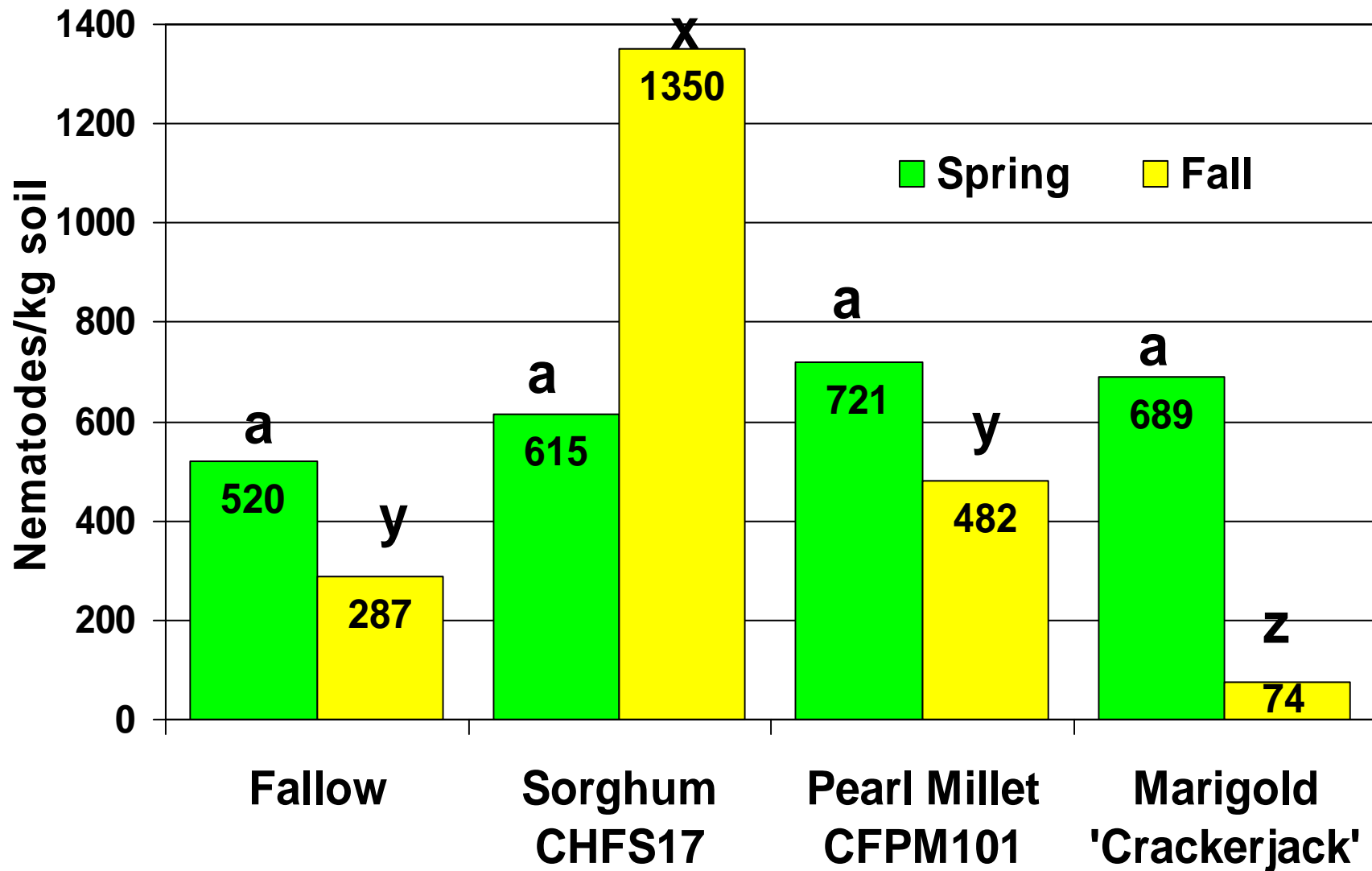
# Root Lesion Nematode Soil Populations

(Ball-Coelho et. al 2003)



# Root Lesion Nematode Populations

(OMAF 2000)



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# Feed - Good Grazing



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# Van Mar Farms Ltd



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*Carpe diem!*







## Making the Fit - Cover Crops

- Establishment
- Killing
- Seed
- Nitrogen cycling





## Planting Options

- Planting Options
  - Broadcast
  - Drilled
  - Flown
  - Slurry seeded (manure)



Function of the cover crop	Best choices for cover crops
Nitrogen production	Red clover, peas, vetch
Nitrogen scavenging	Fall uptake - Oilseed radish and other brassicas, oats Winter/spring uptake – rye, winter wheat
Weed suppression	Oilseed radish and other brassicas, winter rye buckwheat
Nematode suppression	<b><i>Note: variety and nematode specific!</i></b> Cutlass Mustard Sudans/Sorghums - Sordan 79, Trudan 8 Pearl Millet – CFPM 101 Marigold – Crackerjack, Creole Oilseed radish – Adagio, Colonel
Soil structure building	Oats, overwintered winter rye
Compaction busting	Alfalfa, sweet clover
Biomass return to soil	Fall – oats, oilseed radish Summer – millets, sorghum, sudan
Erosion protection i.e. wind, water	Winter rye, winter wheat, ryegrass (well established) spring barley, oats

Establishment  
– getting the  
right cover  
crop for the  
job

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# And there are so many jobs for cover crops

- Interrow with plasticulture
- Harvest rows
- Alternate rows in vineyards





## Quick Growth

- Growth will depend on moisture and heat
- Cover crop oats
  - Planted after wheat harvest (mid August)
  - Heading October 11
- OSR – ~6 weeks from planting to bloom
- Buckwheat ~6 weeks from planting to seed set!

Note: all above are killed with frost but must be managed in case of no frost.

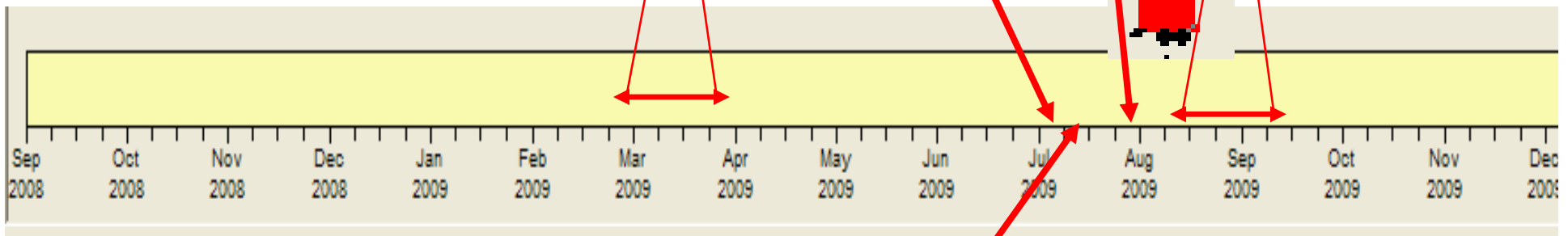


## Seeding Cover Crops (Small Grains or Corn) – Potential Timelines

- Adjust chaff spreader To enhance volunteer wheat
- Interseed Peas into RC bare spots

• Seed RC

• Plant OSR, Oats, Rye Peas etc



• interseed rye into corn

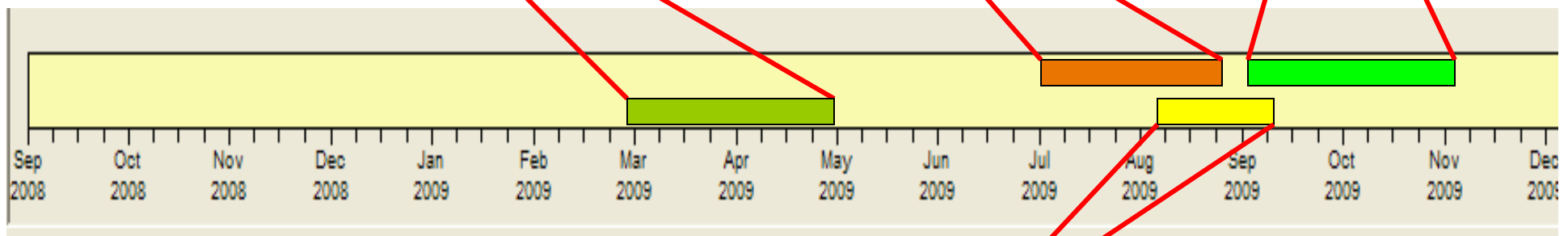


## Seeding Cover Crops (vegetable rotations) – Potential Timelines

Early spring  
wind protection:  
**oats, barley**

Mid summer – warm  
season: **sorghum**  
**sudan, millet,**  
**buckwheat**

Fall living cover  
**rye, winter wheat**



Late summer  
cover **oilseed**  
**radish, peas,**  
**oats**



## Killing Options

- Kill Options
  - Frost
  - Tillage
  - Mowing
  - Roller crimper
  - Chemical







**Know what you are planting!**

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# Sourcing Seed

- **Beyond basic seeds**

- Local ag businesses can source and order
- Check the web for seed sources Managing Cover Crops Profitably
- Un-used treated seeds (ie corn, spinach, snap beans, peas etc)
- By-pass peas or other processing crops

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## Cover Crop Seed Suppliers

Author: OMAFRA Staff  
Creation Date: Not Available  
Last Reviewed: 13 September 2007

[Search By Seed](#)

Seed supplies are highly dependent upon weather and time of year; contact the potential suppliers well in advance of your cover crop needs. This seed supplier listing was developed from the information supplied by the seed suppliers; OMAFRA does not accept responsibility for the accuracy supplied.

This list does not imply any endorsement or recommendation by the Ontario Ministry of Agriculture, Food and Rural Affairs of the companies listed.

If you would like to nominate a supplier for inclusion on the page, email: [ag.info.omafra@ontario.ca](mailto:ag.info.omafra@ontario.ca). The business information you provide will be posted on the OMAFRA website.

Company Name	Contact Information	Seed Available
Abner Bauman	Box 73 Millbank, ON	<ul style="list-style-type: none"><li>• <a href="#">Oilseed radish</a></li><li>• Timothy</li></ul>





## Cover crops – a crop for all seasons

