

New Challenges to Canola Crop Establishment

Jim Bessel, Canola Council of Canada, 94 Duncan Cres., Saskatoon, SK S7H 4K4

Email: besselj@canola-council.org

Darwyn Hammond, Canola Council of Canada, 1 Wexford Bay, Brandon, MB R7B 3K4

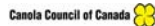
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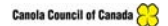
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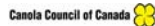
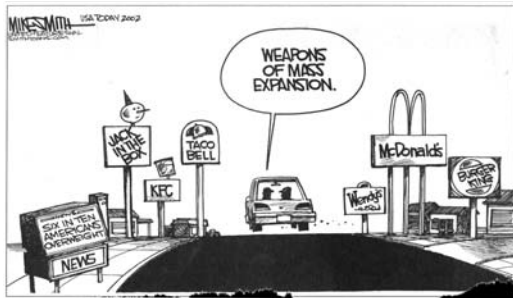
Senior Agronomist & Project Leader



New Era of Canola Production



The World is Changing

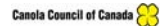


New Era of Canola Production

- Competition in the world oilseed market place is increasing
- A new approach is required

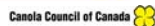


Specialized canola production will assist in keeping Canada competitive/profitable within the global market place



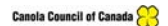
The World is Changing

- Market Reality: Food Industry Leaders are Seeking Lowest Cost Options
- Consumer demands choices with health benefits
- Nutraceuticals, Bio-Fuels, Bio-Plastics, High Stability oils, etc.



New Challenges

- Challenges to Canola Crop Establishment are not necessarily new ?? Basics of Agronomy are still entrenched
- Shifts in management practices are required
- Adopting and applying new technology
- New age of agronomic information is evolving




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 **Crop Establishment**


- ✿ Despite advances in technology in:
 - seed, chemicals, equipment
- ✿ CROP ESTABLISHMENT STILL A MAJOR ISSUE IN WESTERN CANADA




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 **Crop Establishment**


- ✿ Input from CCC agronomists, extension and research staff, and retail agronomists
- ✿ Basics of seeding canola need to be revisited

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 **Management Factors**


- ✿ Seed choice
- ✿ Seeding rate
- ✿ Seed-soil contact
- ✿ Seed depth
- ✿ Seed bed preparation
- ✿ Residue management
- ✿ Seeding speed
- ✿ Soil temperature
- ✿ Diagnosing problems

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 **Stand Establishment Calculation**
Normal Growing Conditions


- ✿ Assumptions; 60% viability... 96% germination... 150,000 seeds / lb
- ✿ 6.0 lb seeding rate X 150,000 seeds/lb = 900,000 seeds/ac
- ✿ 900,000 seeds/ac X 96% germ = 864,000 seeds/ac
- ✿ 864,000 seeds/ac X 60% viability = 518,400 seeds/ac
- ✿ 518,400 seeds/ac ÷ 43,560 ft² /ac =


12 plants/ft²

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 **Seed to Soil Contact**

- ✿ Producers switching to minimum tillage forgetting basics
 - Not using on-row packing
 - Using too little or too much packing
 - Poor seed placement
 - Understanding soil structure
 - Crusting

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 **Seeding Depth**

- ✿ Seeding too deep or seeding too shallow still an issue
 - Uniformity of seeding depth the biggest issue
 - Setting drill for “canola acres” and not individual fields

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Seed Bed Preparation

- ☘ Residue/Trash management not taking place
 - Especially transition from conventional to minimum tillage
 - Plugging and emergence problems
 - Rule of thumb, spread straw & chaff at least as wide as the cut being taken
- ☘ Pre-seed weed control

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Emergence Challenges



Environmental stress; poor root development and emergence failure

Diseases of Field Crops in Canada, 2003, Page 144.

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Dry Growing Conditions

- ☘ Seeds usually have enough moisture to germinate and begin growth, but if deep seeded, slow emerging, etc., could deplete water reserves before emergence
- ☘ Further exacerbated by wind
- ☘ dry spring; not sufficient turgidity left in plant cells for the hypocotyl to break soil surface



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SPEED KILLS

- ☘ Higher speed affects:
 - Seed depth
 - Fertilizer and seed placement
 - Packing (seed-soil contact)
- ☘ Faster generally means less precision
- ☘ Just because you're going faster doesn't make it right!

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SPEED KILLS

- ☘ High acre farmers want efficiency
 - 40 ft drill x (8 ft x 1 mile) = 5 acres/mile
 - 5 acres/mile x 5 MPH = 25 acres/hour
 - 1000 acres canola/25 acres/hour = **40 hours total seeding time**

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SPEED KILLS

- ☘ Drop to 3.5 MPH
 - 5 acres/mile x 3.5 MPH = 17.5 acres/hour
 - 1000 acres/17.5 acres/hour = **57 hours of total seeding time**
- ☘ Difference of **17 hours**
 - What if you have to re-seed?

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Plant Counts

- Do plants counts after seeding
- Keep records of the settings, related to equipment, seed size, seed coating / treatment, bulk density



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Soil Temperature


- Earlier seeding and switch to min-till has decreased soil temperatures at seeding time
 - Producers not paying attention to soil temp
 - Increased time needed for emergence
 - Increased time for seedling disease infection, decrease efficacy of seed treatments

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Flea beetles

Identification:

- Two types;
 - Striped
 - Crucifier
- Overwinter as adults

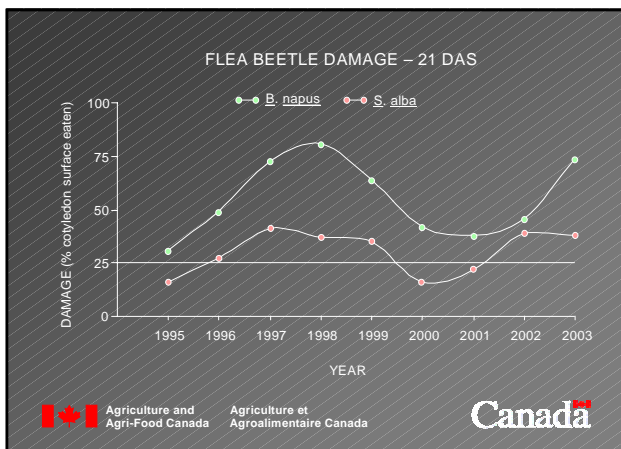


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Flea beetles

- Common in most areas in 2003
- Over winter as adults and migrate from field edges and previous year's canola stubble
- Populations have been increasing over past 2 years
- Potential for similar or higher numbers in 2004

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Flea beetles

Damage:

- Shot holes in cotyledons and leaves
- Need for control depends on crop stage, flea beetle weather conditions

Action Threshold = 25% leaf area damage
Economic Threshold = 50% leaf area damage

Canola most susceptible prior to 4-5 leaf stage



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Flea beetles

Summary

- High populations in fall of 2003
- High risk potential for 2004
 - Consider higher rate seed treatments
 - Scout fields regardless
 - Be prepared for a foliar application if necessary
- Early seeding still provides yield advantages
- Ensure adequate seeding rates
 - Optimum plant stand 70-90 plants/m²

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Cutworms

- ⌘ Problem in some areas in 2003
- ⌘ Overwinter as eggs
 - Laid on or just below soil surface
 - Loose, dry soil in weedy stubble or fallow fields preferred
- ⌘ Larvae emerge in April & May with damage usually most apparent in June
 - Eat into stems and sever them at or just below the soil surface
- ⌘ First signs of damage usually on hilltops or south facing slopes

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Cutworms

Identification

- **Redbacked**
 - Dark grey with 2 broad dull, brick-red stripes
- **Pale western**
 - Greenish or slate-grey, brown head
- Army Cutworm
- Curl up when disturbed



Photo courtesy of Lloyd Dosdall

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Cutworms

Scouting

- Look for cut off canola plants or bare areas
 - Search top 5 cm of surrounding soil using trowel and soil sifter



Photo courtesy of Lloyd Dosdall

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Cutworms - control

Cultural

- Larvae that have fed die if deprived of food
 - Delay between cultivation and seeding (10-14 d)
 - Cold weather following cultivation and seeding

Foliar Insecticides

- Economic threshold
 - 3 to 4 cutworms/m²
 - 25 to 30% stand reduction
- Registered insecticides
 - Check Guide to Crop Protection
 - Apply in evening

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Wireworms

- ⌘ Slender, jointed, and hard-bodied. They have 3 pairs of legs behind the head

- ⌘ Adult beetles emerge from the soil in the spring



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Seedling Diseases

Flea beetle damage to cotyledons

Confirmed with wire-stem (*Rhizoctonia solani*)

D. Kaminski, MAF

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Seedling Diseases

- Wire stem aggravated by:
 - Soil moisture and temperature influence severity
 - Loose, cold and dry soils favour *Rhizoctonia solani*
 - Cold damp soils – Fusarium
 - Wet, heavy soils - Pythium
 - Deep seeding
 - Hypocotyls must grow through more soil
 - In contact with more infested crop residue
 - Short rotations
 - Fungal populations build up in host crop years

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Is the symptom from a disease? Koch's Rules:

- STEP 1. ASSOCIATION** Pathogen must be found in all the diseased plants.
- STEP 2. ISOLATION** Pathogen must be isolated and grown in pure culture or on the host species, and its characteristics described.
- STEP 3. INOCULATION** Pathogen from pure culture must be inoculated on healthy plants and must produce the same disease symptoms.
- STEP 4. RE-ISOLATION** Pathogen must be isolated in pure culture again and its characteristics must be exactly like those in step 2.

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FACTORS INFLUENCING CANOLA VIGOUR

Environmental Conditions (temperature, moisture, soil texture)

Seed Quality: seed lots, varieties, seed size, chlorophyll, storage, seed treatments

Seed and Seedling Vigour (standardized vigour tests)

Insects and Diseases (flea beetles, root maggots)

Seeding Practices: date, depth, conventional, direct, herbicides, seed treatments

Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada

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Nitrogen Fertilizer Placement for Canola

Recommendations and rules of thumb...

Soil Texture	1" Spread Disc or Knife			2" Spread Spoon or Hoe			3" Spread Sweep		
	Row Spacing			Row Spacing			Row Spacing		
	6	9	12	6	9	12	6	9	12
	RWU***			RWU***			RWU***		
Light (sandy loam)	17%	11%	8%	33%	22%	17%	50%	33%	25%
Medium (loam to clay loam)	10	5	0	20	15	10	30	20	15
Heavy (clay to heavy clay)	15	10	5	30	20	15	40	30	20

Source: Prairie Agricultural Machinery Institute
Manitoba recommendations are 10 to 15 lb/ac less

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Soil Moisture Probe

- "Jim's" poor man's software
- 1/2" round rod
- 3 1/2' in length
- Marked in 6" segments
- Weld a handle at the top end and a ball bearing at the bottom end

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Fertility Challenge


- ☘ Measured soil moisture with soil moisture probe
- ☘ Estimated amount of total available water for the growing season by:
 - converting depth of moist soil to amount of available water

plus

estimated in season precipitation

First 3-4 inches of water build the "crop factory"
Each additional inch of water should generate 3 to 5 bu/ac of canola


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Soil Moisture Conversions

Soil Texture	Inches of soil water per foot of moist soil
Sand	0.75
Loamy Sand	1.00
Sandy Loam	1.25
Loam	1.50
Clay Loam	1.75
Clay	2.00

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Fertility Challenge

Soil Zone	Canola Yield Equation
Dry Brown	$Y=(WU-2.5) \times 2.0$
Brown	$Y=(WU-2.25) \times 2.5$
Dark Brown	$Y=(WU-2.0) \times 3.0$
Thin Black	$Y=(WU-1.75) \times 3.3$
Thick/Gray Black	$Y=(WU-1.5) \times 3.6$
Gray	$Y=(WU-1.25) \times 4.0$

SK AG and Food
 Y= yield in bu/ac
 WU= water use; inches of stored soil water + estimated precipitation


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Fertility Challenge

- ☘ Choosing a target yield (example):
 - 3 feet of moist soil (moisture probe)
 - Loam soil = 1.5 inches/foot of moist soil
 - Thin black soil zone
 - Estimated growing season precipitation (May to mid-Aug.) = 7 inches


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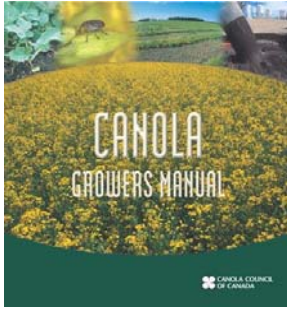

Fertility Challenge

- ☘ Choosing a target yield (example):
 - 3 ft of moist soil X 1.5 (loam) = 4.5" of stored water **PLUS** 7" of estimated precipitation = 11.5" of water use (WU)
 - Yield equation: $Y=(WU-1.75) \times 3.3$
 - $Y= (11.5 - 1.75) \times 3.3$
 - $Y= 32.2 \text{ bu/ac}$

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Getting Information Farmers Need

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