

Crop Sequence Considerations When Growing Canola

Stewart Brandt
Research Scientist



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

Anastasia Kubinec
Oilseeds Specialist



Canada 

Crop Sequence Outline

How crops affect those that follow

Moisture, weed, disease, fertility

Yield responses in varying sequences

What research trials tell us

What crop insurance data tells us (Manitoba)

Growing canola after forages

Timing and method of termination

Decision making dependent on many factors

Intensifying canola rotations

Moisture Effects

Maturity differences

- As crops mature they stop using water
 - Earlier maturity can increase storage for subsequent crops

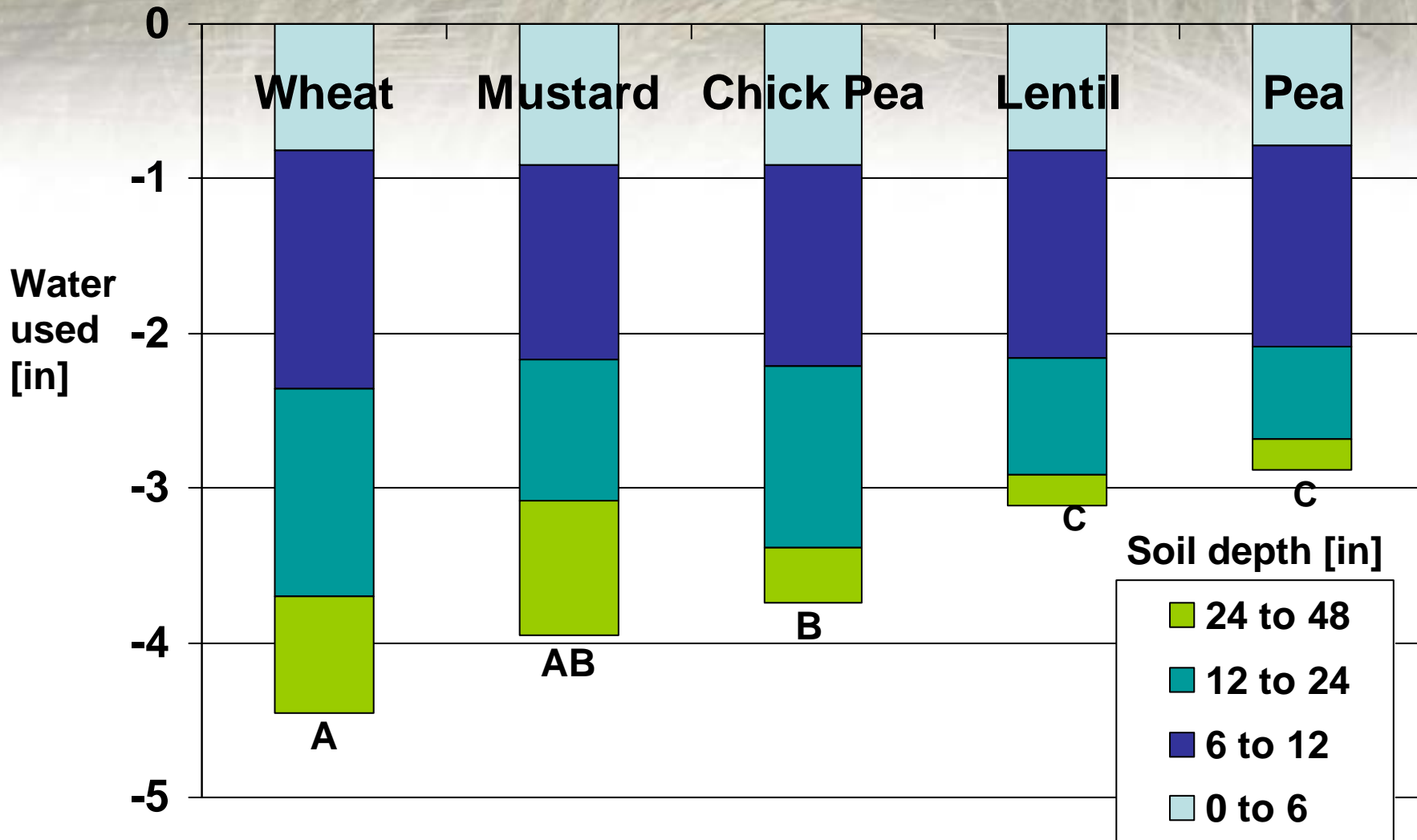
Differences in crop water use

- Rooting depth decreases in the order
perennials>biennials>winter cereals>spring cereals
and oilseeds>pulses

Snow trapping

- Taller stubble crops [cereals, canola, mustard] trap more snow more effectively than shorter stubble crops [pea, lentil, flax]
- Results depend on how much snow and on infiltration³

Soil Water Used by Crops in Southern SK. Average of 3 years [1996-98] at 2 locations



Weed Control Considerations

Target annual broadleaf weeds in cereal crops

- Costs are lower (\$2-6/ac vs \$ 10-25/ac)
- Numerous species controlled
- Can reduce losses, control costs in broadleaf crops

Target grassy weeds in broadleaf crops

- Costs may be lower
- Permit herbicide rotation to avoid weed resistance
- Can reduce losses and control costs in cereal crops

Herbicide Tolerant Canola Has Changed us!

- RR canola has become a clean-up crop
- LL canola is breaking farmer yield records every year
- We are tempted to break agronomic 'rules'
- Recognize what you are doing if you shorten rotations

Disease Considerations

- Disease must be present
- Crop must be susceptible
- Climate must be favorable

- Changing crop types breaks cycle of disease build-up
 - Less disease is present

Previous Crop Stubble

	Wheat	Canola	Pea	Alfalfa
Canola	None	RR:L2, DO:L1, SD:H4, BG:H3	RR:L1, DO:L1, SD:M3,	RR:L2, DO:L1, SD:L3

- After canola and field pea need to watch out for sclerotinia as medium to high risk for 3 years
- Sclerotinia also identified in risk after alfalfa
- Blackleg is the concern on canola-canola rotation

Nutrient Use by Crops

Nitrogen-fixing crops

- Fix nitrogen from the air
- May extract less N from soil
- Provide more N to subsequent crops from decomposing residues

Mycorrhizal vs non mycorhyzzal crops

- Form loose associations with fungi in soil
- Increase effective size of roots
- Improves uptake of nutrients like P
- Canola non-mycorrhizal can affect the crops like need mycorrhizal loving crops like flax, pulses, corn

Nutrient cycling from residues

- Dependent on crop type, quantity and quality



**Yield responses in
varying sequences**

Crops Yield More When Grown on Stubble of Another Crop Type : Research Results

Yield as % of yield when grown on their own stubble

<u>Stubble type</u>	<u>cereal</u>	<u>oilseed</u>	<u>pulse</u>
Cereal	100	100-150	100-125
Oilseed	100-135	100	100-115
Pulse	100-150	100-190	100

Source: Adapted from rotation and sequence studies at Melfort, Aylsham, Scott and Swift Current

Crops Yield More When Grown on Stubble of Another Crop Type : Manitoba Crop Insurance

Yield as % of yield when grown on their own stubble

<u>Stubble type</u>	<u>cereal</u>	<u>oilseed</u>
Cereal	100	113-124
Oilseed	108-127	100
Pulse	105-123	108-137

Canola Yield on Varying Stubble Types

Stubble Type	Yield (% canola) On canola stubble	
Canola	100(100)	
Winter wheat	113(na)	
Spring wheat	124(114)	
Barley	120(115)	
Oat	114(117)	
Flax	118(118)	
Pea	122(128)	
Soybean	101(na)	

Values are averages for 1998 – 2007, brackets are averages for 1994 - 1998

Crop Yield on Canola Stubble

Crop	Yield (% overall) Average yield	% Yield Gain on canola stubble vs. own stubble
Winter wheat	104(na)	+37 (na)
Spring wheat	103(106)	+14 (+18)
Barley	105(105)	+19 (+19)
Oat	104(108)	+22 (+27)
Flax	90(92)	na
Pea	93(89)	na
Soybean	99(na)	na

Values are averages for 1998 – 2007, brackets are averages for 1994 - 1998



Seeding Canola after Forages?

Considerations For Seeding Canola after Forages



#1 Type of forage

#2 Time of termination

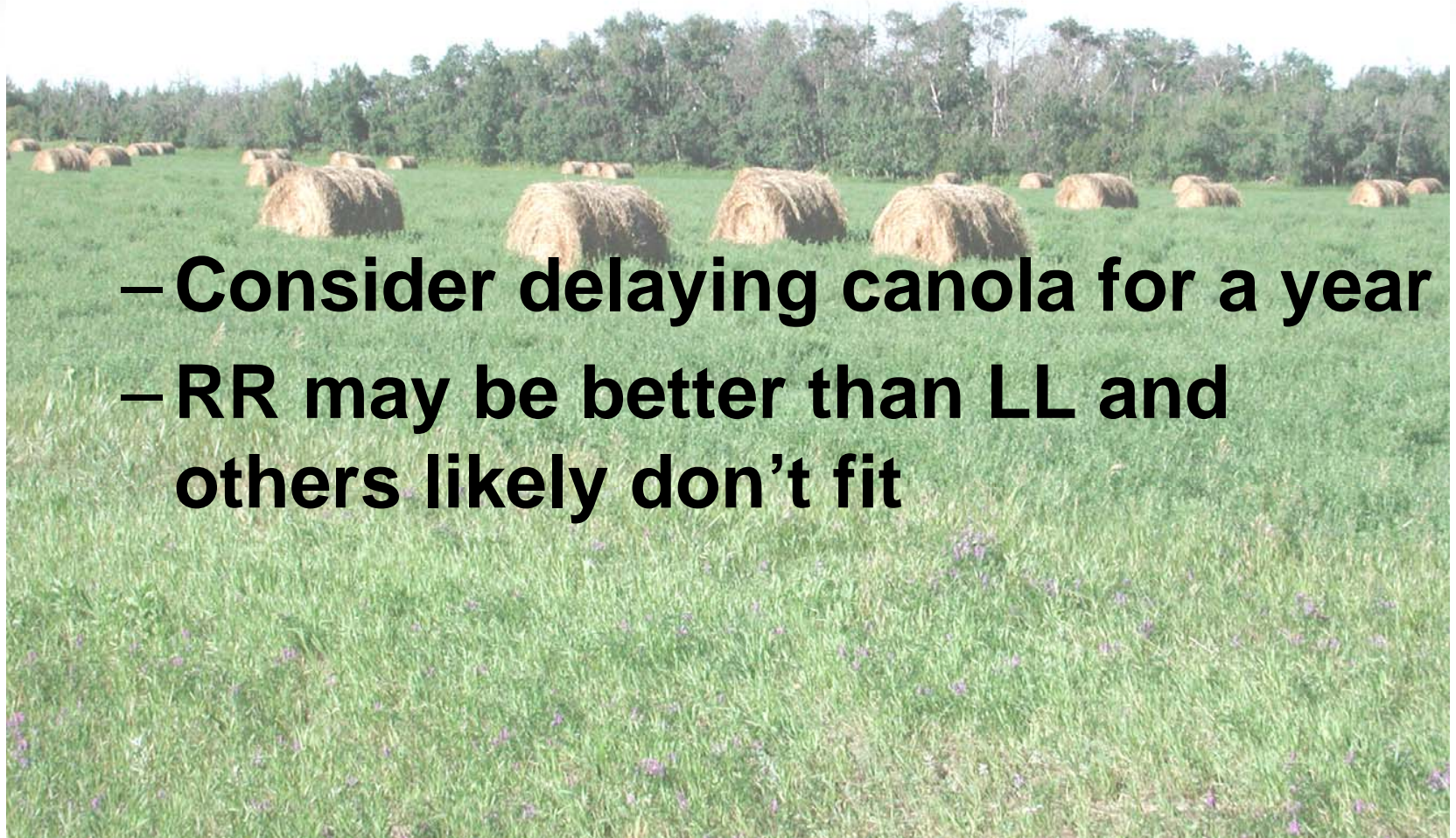
#3 Is the forage is fully controlled

#4 The correct opener on air-drill

#5 Is canola the right choice?

Forage Re-growth....

- **Can reduce yield by 50%**
- **Can interfere with harvest**



- **Consider delaying canola for a year**
- **RR may be better than LL and others likely don't fit**

Volunteer Control Can Affect Canola Selection

- Think of volunteer perennial plants like dandelions – tough to kill, are all herbicides going to work?
- Use your “Guide to Crop Protection” charts
- “Getting out of Alfalfa with Herbicides” (MAFRI)
 - <http://www.gov.mb.ca/agriculture/crops/forages/bjb00s12.html>



Managing Seeding Conditions

- May need to increase seeding rates to compensate for questionable seed bed
- Termination including tillage:
 - Cloddy soil – small seeded canola could have issues emerging, need good moisture to “mellow up” soil bed
- No-till, chemical termination:
 - Caution around seeding into soil vs. thatch layer

Moisture Conditions & Recharge

- Earlier termination increases moisture
- Better forage control reduces moisture use
- No till reduces moisture loss

- Recharge but don't overfill soil profile
- Excess moisture leaches N from rooting zone
AND increases denitrification
- Recharge quicker in parkland vs. Dry prairie
- Clays more moisture > loams > sandy soils

Termination method

Tillage hastens N release from forage residues.

- Incorporated residues release N about twice as fast as residues on surface.
- Most N released in second year, possibly third with tillage.
- Tillage causes moisture loss.

Chemical followed by tillage sometimes best compromise. (Nick disagrees!).

- 2 strategies for control better than 1.
- Tillage hastens decomposition.
- Chemicals only in dry climates.



Termination Method

- o Creeping red fescue has thin waxy leaf - 2 litres glyphosate +.
- o Broad leaved grasses are easier to spray out. (Tribenuron-methyl in fall controls dandelions).
- o Alfalfa is very deep rooted, glyphosate won't go all the way. Won't re-grow if sprayed with low rate of clopyralid as well.
- o Do you have the right openers for seeding into forage stubble?
- o Seed to soil contact is a MUST.

Type of forage

- Pure alfalfa stands have more N and release it more quickly.
- Mixed, weedy or grass only will likely require more fertilizer N.
- CRF stubble will have almost no N, so band below thatch, near the seed.
- Important to soil test and provide field history.

When to Seed Canola ?

Canola may fit as first crop if;

- Forage was primarily alfalfa
- Forage was terminated early [with some tillage]??????
- [Tillage will make seedbed WORSE!!]
- Forage is completely controlled [RR vs LL?]

May want to consider wheat, flax [or peas] first

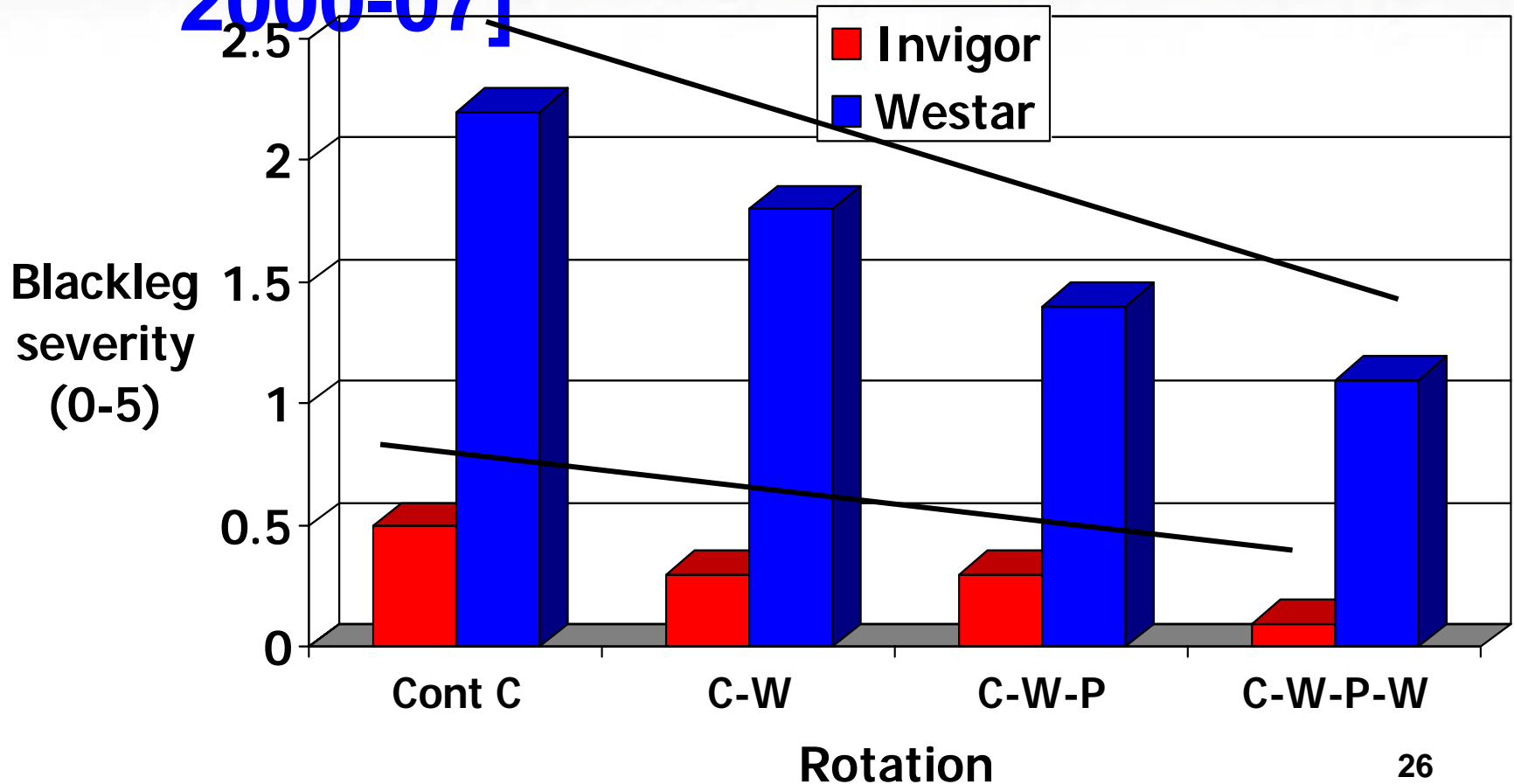
- After perennial grasses
- If terminated late, is it dead?????
- Lower nutrient requirements of flax; Protein response of wheat to N late in season
- Larger seeded wheat if seedbed has poor structure



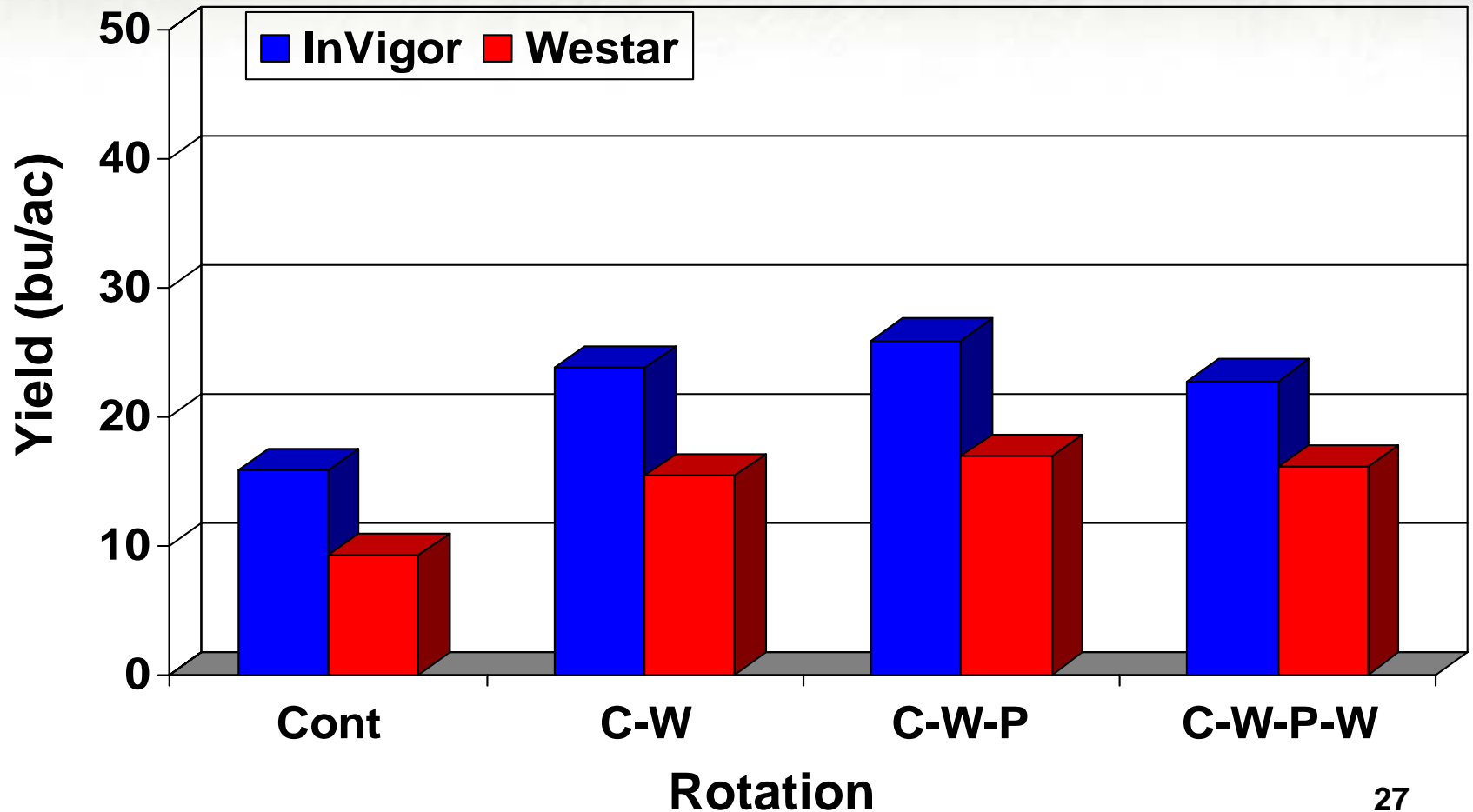
Thinking of Intensifying Intensifying Canola Rotations?

Influence of rotation length on blackleg

[14 site-years at Scott and Melfort, 2000-07]

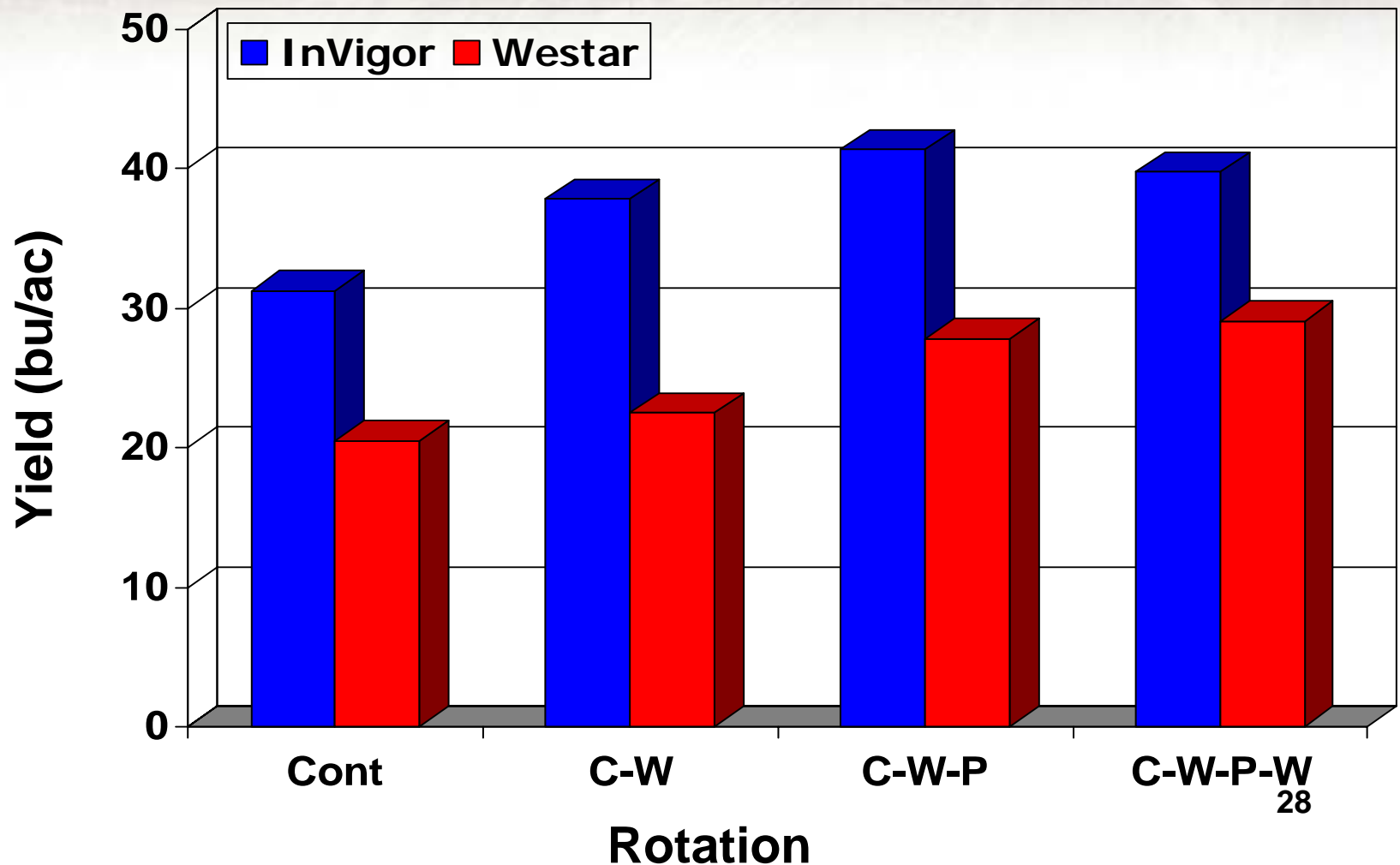


Influence of rotation on canola yield; [Scott and Melfort 2000-2003, dry conditions]



Influence of rotation on canola yield

[Scott and Melfort 2004-2006, normal moisture]



Preliminary Economics : Intensifying Canola Rotations

Seed:

- Westar @ \$2.20/lb
- InVigor @ \$7.00/lb

Herbicide Cost = \$27.25/ac (SK Ag)

- Actual costs were less for InVigor, more for Westar

Fertilizer costs (SK Ag)

- Fertilizer costs less than speculated

Grain prices - 1997-2006 averages [SAF]

- Canola at \$312/t [\$7.10/bu]
- Pea at \$160/t [\$4.35/bu]
- Wheat at \$144/t [\$3.90/bu]

Economics – COSTS

Rotation	Variable costs [\$/ac]	
	Invigor	Westar
Continuous canola	151	125
Canola-wheat	136	123
Canola-wheat-pea	126	117
Canola-wheat-pea-wheat	125	118

Net Returns [\$ /ac]

Averages for Scott and Melfort

Rotation	2000-03 (dry)		2004-06 (norm)	
	InVigor	Westar	InVigor	Westar
Continuous canola	-38	-59	71	21
Canola-wheat	32	-13	132	37
Canola-wheat-pea	57	3	168	80
Canola-wheat-pea-wheat	37	-4	157	88

Intensive Canola Rotations

- Growing canola more frequently increases blackleg, even with resistant varieties
- Will intensive rotations increase risk that blackleg resistance will break down?
- Weed control is not a major constraint with HT canola
- Need better understanding of sclerotinia implications??



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CONCLUSION



A well planned and managed rotations puts all available crop management tools into use

Thank You!!

Stewart Brandt, M.Sc.

Research Scientist, Soil and Crop Management

AAFC Scott Research Farm

Telephone: 306-247-2011 (22)

Email: brandts@agr.gc.ca

Anastasia Kubinec, M.Sc.

Oilseeds Specialist

Crops Knowledge Centre

Manitoba Agriculture, Food and Rural Initiatives

Telephone: 204-745-5645

Email: anastasia.kubinec@gov.mb.ca



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