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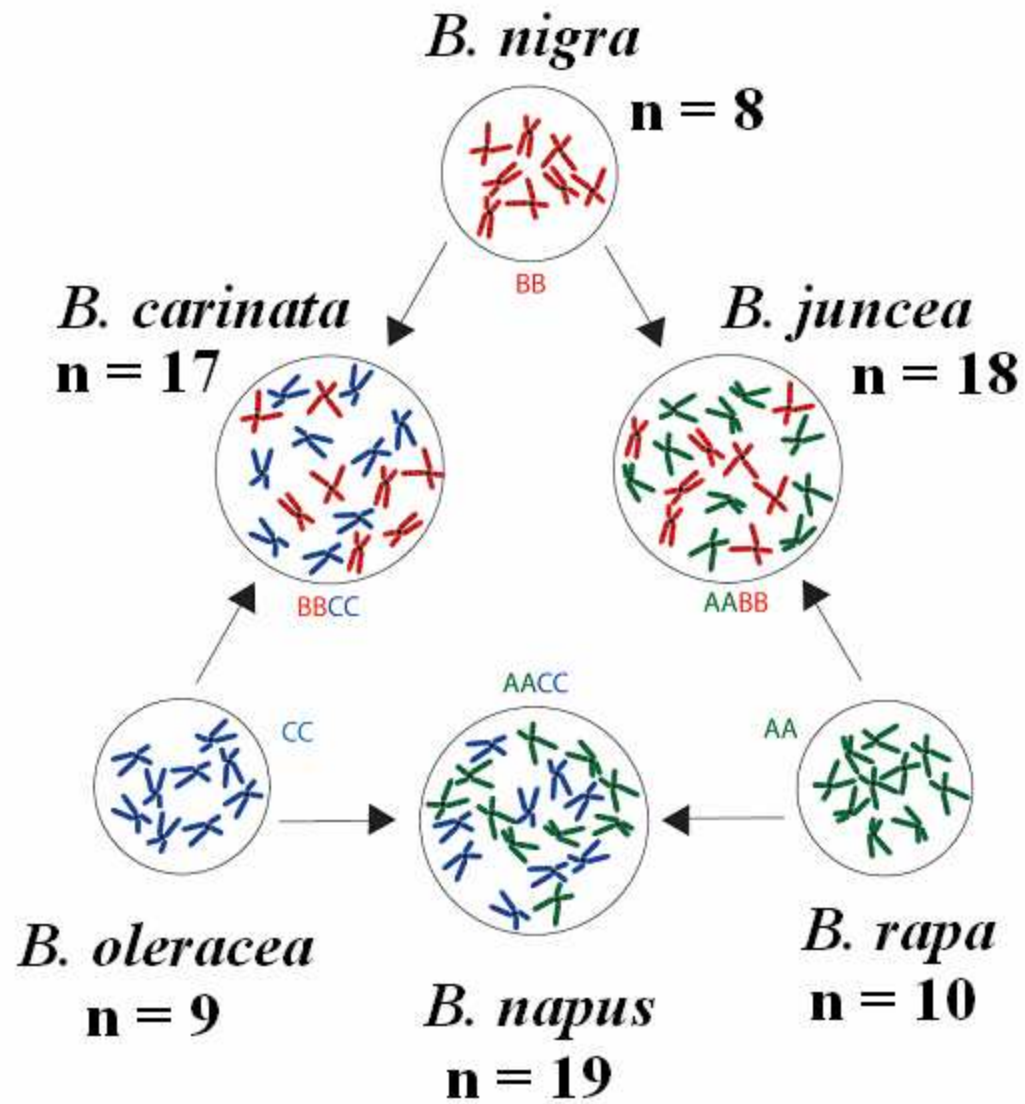
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## ***Brassica carinata* breeding: development of high glucosinolate bi-products**

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**Canada**





***Brassica napus***  
***cv. AC Excel***

***Brassica carinata***

## ***B. carinata* breeding - current/future work**

### **Early maturing strains & industrial platforms.**

- High oil/protein content and high glucosinolates - bio-refinery.
- Second generation germplasms have been developed and are being evaluated by industry. Focus on bio-lubricants not fuel.

### **Novel fat profiles/high glucosinolates.**

- Low erucic acid forms (interspecific transfer) field tested (stable).
- Low C22:1 strains are currently being used by three industry (two Canadian and one EU) as well as institutional partners.
- High sinigrin lines were identified.

### **Future direction/work.**

- Work continues to identify early maturing/adapted lines and DHs.
- Focus on meal (high protein fish feed) and high/low erucic acid oil.
- Hybridization system - maximize yield and improve uniformity.
- Novel quality profiles using new technologies & processes.

## High and low erucic fat profiles in *B. carinata*

Fatty acid (%)	Typical profiles		<i>Brassica carinata</i>	
	<i>B. napus</i> (canola)	<i>B. juncea</i> (mustard)	High erucic	Low erucic
C16:0 + 18:0 (palmitic + stearic)	5.7	3.1	3.8	5.5
C18:1 (oleic)	65.6	13.7	7.9	31.8
C18:2 (linoleic)	23.2	16.9	16.6	32.6
C18:3 (linolenic)	2.2	15.5	13.7	26.5
C20:1 (eicosenoic)	1.4	8.8	7.4	1.2
C22:1 (erucic)	0.0	34.9	41.4	0.2



## ***B. carinata* Bio-refinery Trial #14, Saskatoon 2007.**

Treatment/Entry	DTM (days)	Yield (kg/ha)	Oil (%)	Protein (%)	GSL ( $\mu\text{mol/g DW}$ )
050334EM	93	2024	34.3	31.0	123
050331EM	97	1958	34.4	30.5	107
050510EM	94	1850	39.6	28.2	103
050483EM	93	1803	39.5	29.0	106
050336EM	92	1751	37.3	29.1	110
AC Vulcan	83	1982	38.5	29.2	152



## Mutagenized *B. carinata* lines with high sinigrin

<b>Entry</b>	<b>Sinigrin (allyl)</b>	<b>Total glucosinolates (<math>\mu\text{mol/g DW}</math>)</b>
2092-10	147.5	157.9
2113-10	159.4	174.0
2113-23	157.2	170.0
2103-26	151.1	159.3
2071-14	144.6	154.2
AC Vulcan ( <i>B. juncea</i> )	153.9	159.2





## Some information about glucosinolates

- **Occurrence**

The order *Brassicales/Capparales* (including the family *Brassicaceae*, *Capparidaceae*, *Caricaceae*)  
the genus *Drypetes* (family *Euphorbiaceae*)

- **Taste/flavour**

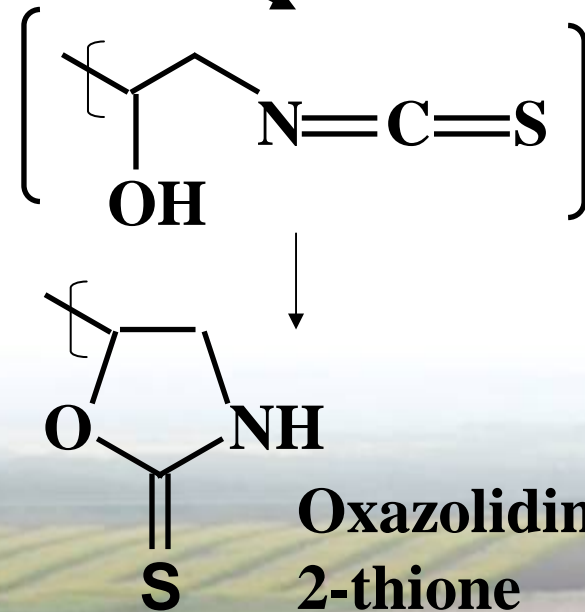
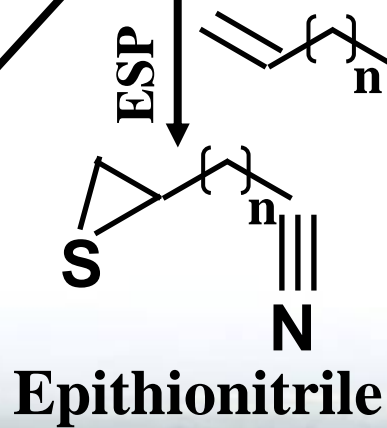
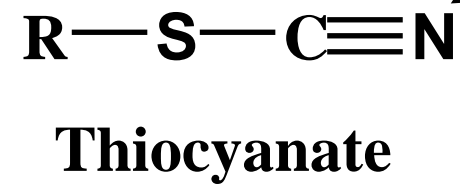
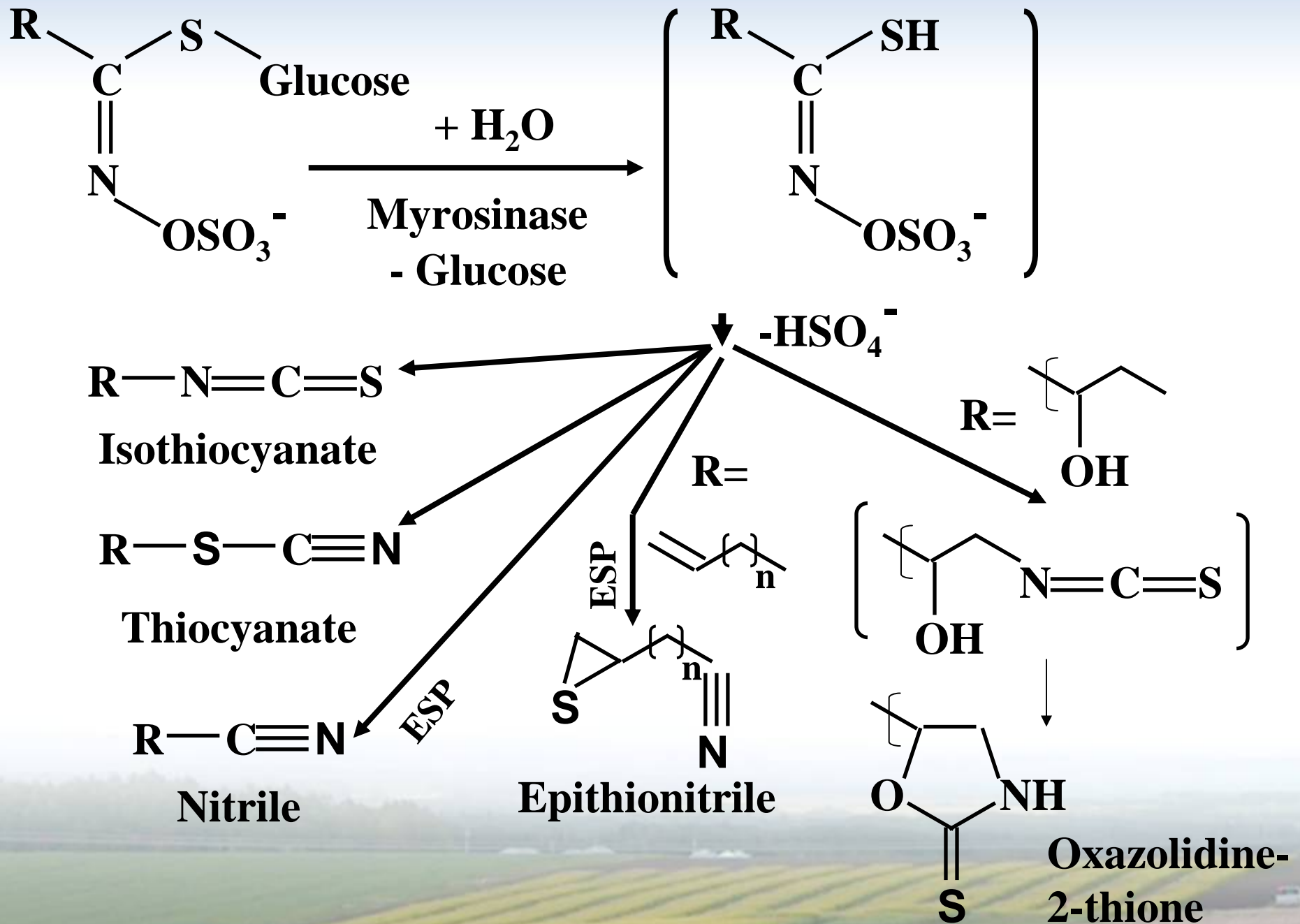
- **Effect on animal growth**

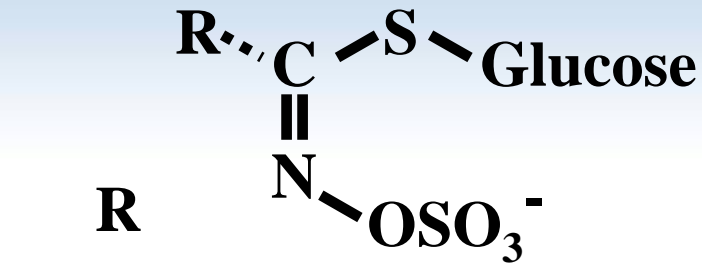
- **Repellent** to some insects/**attractants** for others

- **Bio-fumigation** to suppress pathogens, nematodes and weeds.

- **Cancer-prevention agents**



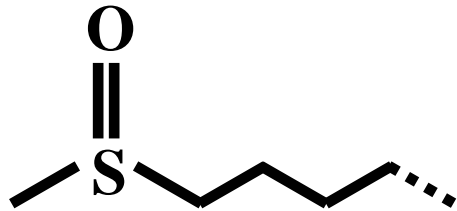




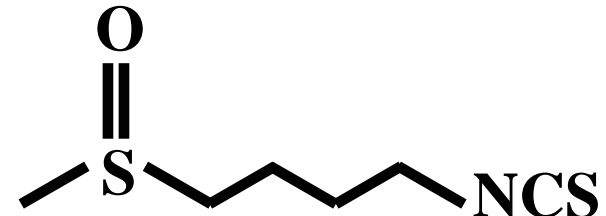
Allylglucosinolate  
(Sinigrin)



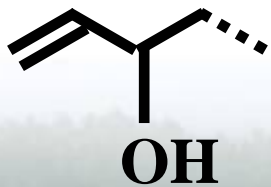
Allyl isothiocyanate (AITC,  
3-isothiocyanato-1-propene)



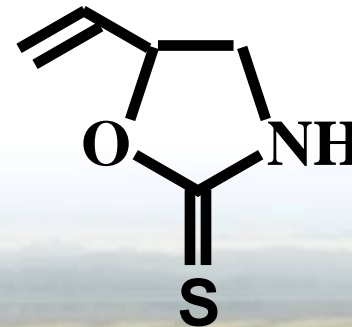
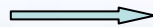
4-Methylsulfinylbutyl  
glucosinolate (Glucoraphanin)



1-Isothiocyanato-4-methyl-  
sulfinylbutane (Sulforaphane)



2-Hydroxy-3-butenyl  
glucosinolate  
(Progoitrin/Epiprogoitrin)



5-Ethenyl-1,3-oxazolidine-  
2-thione (Goitrin)

# **Glucosinolate biosynthesis**

**Amino acids (side chain may be elongated)**

**Biosynthesis of the core structure of glucosinolates**

**Various secondary transformations**



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Canada 