

# Brassica Quarantine District

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# Small-seeded vegetable seed crops in WA

## Northwestern WA (since late 1800s):

Table beet, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, Chinese mustard, collard, cress, kale, kohlrabi, radish, rutabaga, spinach, Swiss chard, turnip...

## Columbia Basin of central WA (since irrigation in 1950s):

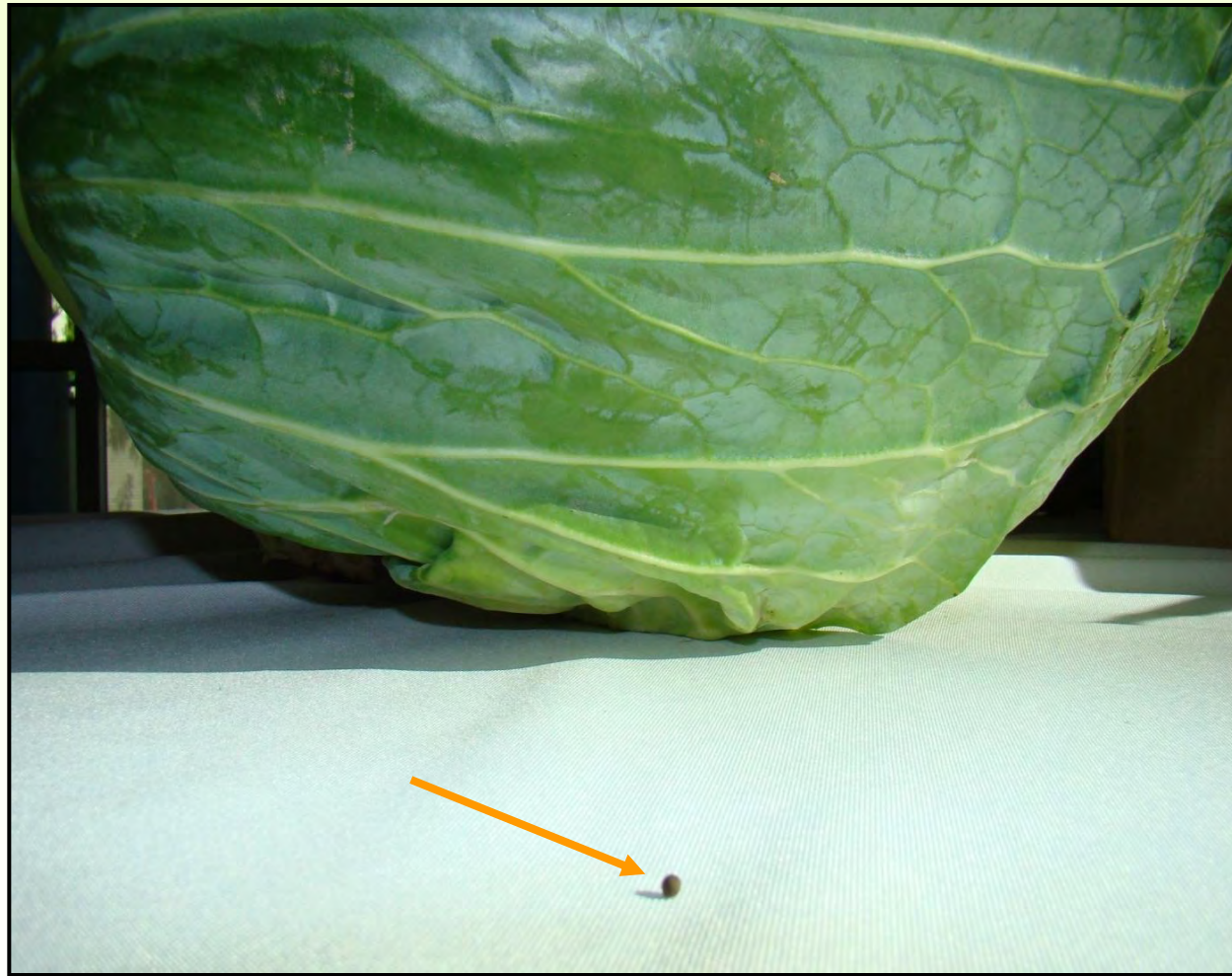
Carrot, canola, coriander, dill, kale, mustard, onion, parsley, parsnip, radish, turnip...

**~35 species** (many annual & biennial *Brassicas*)

10,000-15,000 total acres/year, \$1,000-\$8,000/acre  
>\$65 million annually

50-100% of U.S. seed supply; 10-50% of world seed supply





1 acre  
hybrid cabbage  
seed crop



2,000 lb seed  
(plants  
~10,000 acres  
head cabbage)



50 million lb  
head cabbage



# Biennial brassica seed production in western WA

Seed sown in greenhouses in Jun., 'hardened' in Aug.



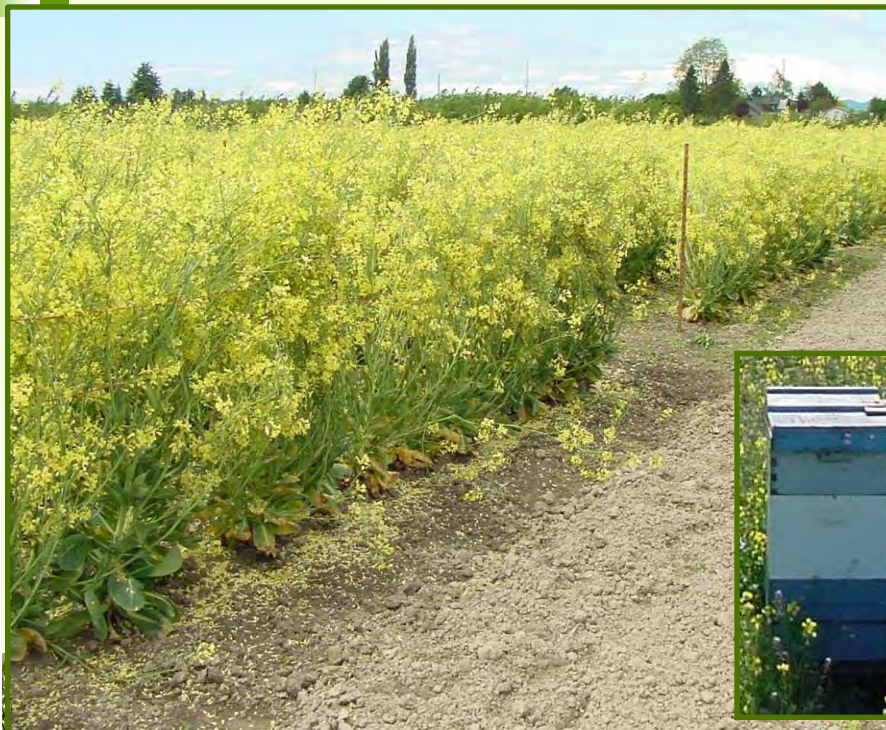
Seedlings transplanted in Aug.-Sep.



Overwintered (vernalized)









# Competing in the international vegetable seed industry

- Trueness-to-type (genetically)
- Seed germination (>85%)
- Excellent seed vigor
- Pathogen-free seed
- Seed lots free of weed seed & other debris (99%)
- Competitive production and labor costs



**All commercial vegetable seed production in WA is done under bailment contracts between seed company (bailor) and seed grower (bailee)**

# Isolation of Brassica seed crops



- Needed to avoid cross-pollination among cultivars (within and among open-pollinated and hybrid seed crops), as well as cross-compatible crops (related brassica species)
- Isolation distances vary depending on market vs. stock seed crops
- From 0.25 to >3 miles



# Vegetable seed crop “pinning” meetings

- Seed company field reps meet with WSU Extension Educator to map locations of seed crops
- 1 February or 1 March (annuals, stecklings)
- 1 June (biennials)
- WSU Mount Vernon NWREC, WSU Grant/Adams Co.









*Biodiesel "will be the biggest issue that the Legislature will be focusing on."*

Clifford Traisman, a lobbyist for Washington Conservation Voters and the Washington Environmental Council

## Environmentalists make strides in legislative session

By **RACHEL LA CORTE**  
Associated Press Writer

OLYMPIA — Washington state's environmental community

**Biod**

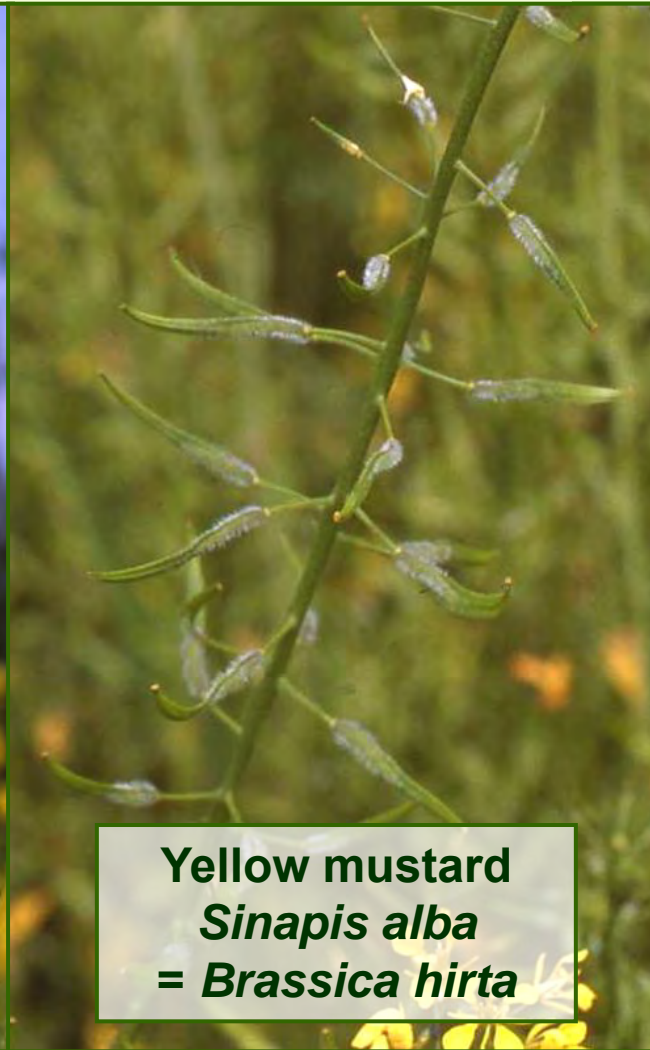
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**Skagit Valley Herald, 2 January 2006**





# Mustard, rapeseed, canola

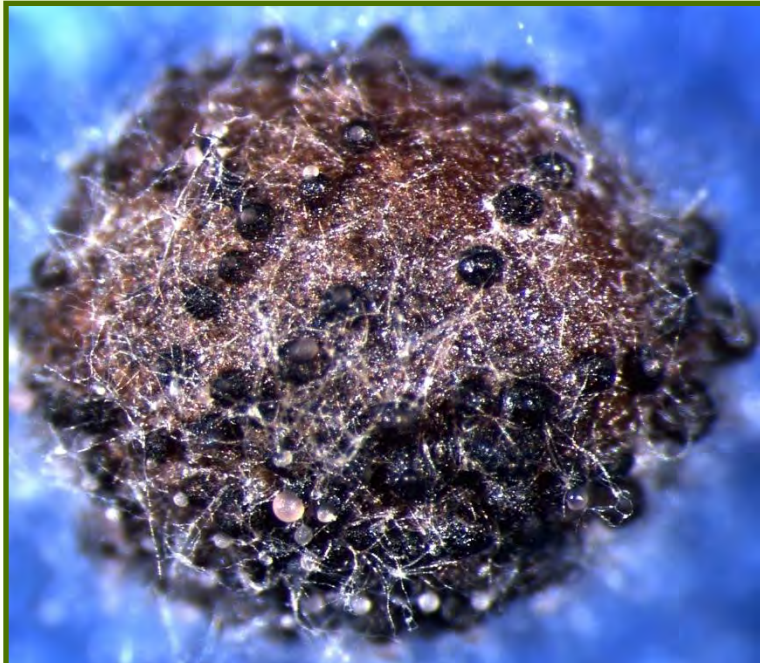




# Seedborne crucifer pathogens:

## An economic concern in western Washington

**Black leg (fungal disease)**  
*Phoma lingam*



**Black rot (bacterial disease)**  
*Xanthomonas campestris* pv. *campestris*





# Dormant crucifer seed







# Crucifer Quarantine for Western Washington: Why? How?

**Puget Sound Seed Growers Association & Western WA Seed Advisory Committee petitioned WSDA (2004)**

1. Establish crucifer quarantine for western WA
2. Add black mustard (*Brassica nigra*) & wild radish (*Raphanus raphanistrum*) to list of restricted noxious weed seeds
3. Delete “in rapeseed only” from black mustard & wild radish references in WAC 16-301-105 (Seed Certification – Objectionable Weeds).

**WSDA Seed Program reviewed request, WSDA rule-making process with input from WSU specialists & affected industries:**

PSSGA, CBVSA, WA Canola Commission, researchers, growers, seed co.'s

**Economic impact survey:** sent to 189 stakeholders (2005)

**Public hearings:** 6 Dec. (Mount Vernon) & 9 Dec. 2005 (Moses Lake)

**WSDA Director Loveland signed rule: 21 Dec. 2005**

**Crucifer Quarantine Rule (WAC 16-301): effective 20 Jan. 2006**





# WASHINGTON STATE LEGISLATURE

## Chapter 16.301-490-580 WAC General Seed Regulations

Crucifer seed  
quarantine rules  
20 Jan. 2006

### WAC Sections

- 16-301-490 Why is the department establishing a crucifer seed quarantine?
- 16-301-495 What definitions are important to understanding this chapter?
- 16-301-500 What crucifer articles are regulated by this chapter?
- 16-301-505 What diseases are regulated by this chapter?
- 16-301-510 What seed must undergo dormancy testing?
- 16-301-515 What is the quarantined area for this crucifer seed quarantine?
- 16-301-520 What is the regulated area for this crucifer seed quarantine?
- 16-301-525 What are the exemptions to the crucifer seed quarantine that apply within the regulated area?
- 16-301-530 What requirements apply to planting crucifer seed in the regulated area?
- 16-301-535 What requirements apply to boxes & racks used to ship crucifer seedlings?

<http://apps.leg.wa.gov/WAC/default.aspx?cite=16-301>



- Implications for regulated counties in northwestern WA:
  - Clallam, Island, Lewis, Skagit, Snohomish, & Whatcom Co.'s
- Crucifer materials regulated:
  - Seed, seedlings, roots, or transplants for seed, oil, or commercial vegetable production; & crucifer crop residues
- Notice of Intent/Quarantine Compliance Form:
  - Must be filed with WSDA Seed Program before shipping, moving, or transporting crucifer seed into regulated area
    - Lab analysis or **phytosanitary certificate** for regulated diseases
    - **Seed analysis certificate for dormant seed** (WAC 16-301-510)
- Seed lots that test positive:
  - Must be treated
  - Treated seed can only be planted if free of pathogens when re-tested
- Exemptions in regulated counties:
  - USDA & University research trial grounds
  - Pre-packaged crucifer seed <0.5 oz, if free of diseases
  - Seedlings for home garden use, if free of diseases
  - Crucifers produced in greenhouses or indoors (solely)



# WASHINGTON STATE LEGISLATURE

## Chapter 15.51 RCW Brassica Seed Production

Authorizing statute for  
Brassica seed  
production district rules

### RCW Sections

- 15.51.010 Findings - Purpose.
- 15.51.020 Definitions.
- 15.51.030 Brassica seed production districts - Grower's petition - Rules.
- 15.51.040 Brassica production agreements.
- 15.51.050 Rules.
- 15.51.060 Violation or threatened violation of chapter - Action to enjoin.
- 15.51.070 Application of chapter 34.05 RCW.
- 15.51.900 Effective date - 2007 c 181.
- 15.51.901 Captions not law - 2007 c 181.

<http://apps.leg.wa.gov/RCW/default.aspx?cite=15.51>





# WASHINGTON STATE LEGISLATURE

## Chapter 16.326 WAC

**Brassica Seed District Rules: 2008**

## Brassica Seed Production Districts

### **WAC Sections**

- 16-326-010 What are the boundaries of the regulated areas, also called the Brassica seed production districts?
- 16-326-020 What are the general requirements for growing, transporting or processing Brassica seed within any Brassica seed production district?
- 16-326-030 What are the requirements to grow Brassica seed in Brassica seed production district 1?
- 16-326-040 What are the requirements for growing Brassica seed in all of Brassica seed production district 2, which is composed of two subdistricts designated districts 2A and 2B?
- 16-326-050 What are the differences between restrictions on Brassica seed production in Brassica seed production districts 2A and 2B?
- 16-326-060 What is the Brassica work group and how often does it meet?

<http://apps.leg.wa.gov/WAC/default.aspx?cite=16-326>



## ■ Western WA

- Since crucifer districts created, no fields of canola grown in **western WA** Brassica vegetable seed production district
- 2009: cabbage seed industry had most acres pinned since 1999

## ■ Central WA

- Irrigated canola production has not taken off
- Only grown regularly for oil production in deep well areas on borders of irrigated Columbia Basin, where canola is a good crop to grow with the limited water available.
- With no water restrictions, there are [better] crops to grow so farmers have not been very interested ... **7,314 acres in 2006 to 13,324 acres in 2008**

## ■ Canola seed fields

- Grown in Columbia Basin
- **Pinned in seed crop mapping system, just as they would have been without the new rules**

## ■ Black leg of canola

- Found in Bonner's Ferry, ID in 2011 (Paulitz et al., USDA ARS)
- Demonstrates potential for establishment in Columbia Basin





# Thank you

*Dr. Timothy Miller, Weed Scientist, WSU Mount Vernon NWREC*

*Dr. Debra Inglis, Plant Pathologist, WSU Mount Vernon NWREC*

*Mr. Don McMoran, Extension Horticulturist, WSU/Skagit Co.*

*Dr. Carrie Wohleb, Extension Horticulturist, WSU/Grant Adams Co.*

*Dr. Scot Hulbert, Plant Pathologist, WSU Pullman*

*Washington State Department of Agriculture Seed Program*



Some additional slides/information





## Seed growers in western & central WA:

Not replace a profitable, high value, specialty crop (cabbage seed) with a 'non-profitable' commodity crop (canola)

## Other growers:

Want benefits of new, alternative crops like canola



WSDA Seed Program reviewed Crucifer Quarantine request, rule-making process with input from WSU specialists & affiliated industries - **PSSGA, CBVSA, WA Canola Commission, & vegetable seed companies and growers**

# One of the world's 25 most important food crops with sexually compatible weed species

From: **CAST Issue No. 37, Dec. 2007**. Implications of gene flow in the scale-up & commercial use of biotechnology-derived crops: Economic and policy considerations.

Rank	Crop	Scientific name	World area planted (M Ha)	World yield (MT)	Sexually compatible weeds	Rank among world's worst weeds	Geo-graphic distribution
11	Rape seed (canola)	<i>B. napus</i> <i>B. rapa</i>	24	36	<i>B. napus</i> <i>B. juncea</i> <i>B. rapa</i> <i>R. raphi-nastrum</i> <i>S. arvensis</i>	>180	World wide



# Canola: Production, export, & biological factors that influence dispersal & persistence of transgenes

*From: **CAST Issue Paper No. 37, Dec. 2007.** Implications of gene flow in the scale-up & commercial use of biotechnology-derived crops: Economic and policy considerations.*

Harvested in U.S. in 2005 (millions of hectares)	0.45
Harvested in Canada in 2005 (millions of hectares)	5.51
% Biotech in 2005, U.S.	82
% Biotech in 2005, Canada	82
Percentage of yield exported in 2005, U.S.	20
Percentage of yield exported in 2005, Canada	48
Extent of outcrossing	Moderate (limited at long distance)
Sexually compatible, wild or weedy relatives in U.S.	Common
Extent of volunteers in rotational crops within ag.	Common
Extent of volunteers outside agriculture	Common



- Bird predation
- Spillage in transport
- Wind shatter





# Canola: Biology & gene flow

(From: **CAST Issue Paper No. 37, Dec. 2007.** *Implications of gene flow in the scale-up and commercial use of biotechnology-derived crops: Economic and policy considerations.*)

Production	Pollen	Seeds & Grain	Volunteers
<ul style="list-style-type: none"><li>- Bred for oil quality</li><li>- 3<sup>rd</sup> most important source of veg oil</li><li>- OP &amp; hybrids</li><li>- Hybrid cultivars rarely re-planted</li><li>- 3 herbicide resistant traits commercialized in 1996</li><li>- Biotech cv. use has not blocked trade to most major markets</li></ul>	<ul style="list-style-type: none"><li>- Most self-pollinate; outcrossing = 12-55% frequency</li><li>- Dispersed by insects</li><li>- Pollen-mediated outcrossing (up to several km)</li><li>- OP &amp; hybrid lots with transgenes: trace - 2%</li><li>- Outcrosses w/ volunteers may have 2+ h'cide resistance genes</li></ul>	<ul style="list-style-type: none"><li>- Grain may be co-mingled after harvest</li><li>- Seeds are small &amp; pods shatter</li><li>- Harvest seed loss can exceed seeding rates</li><li>- Grain loss in handling is hard to predict</li><li>- Management practices used in Canada</li></ul>	<ul style="list-style-type: none"><li>- Seeds germinate along roadways</li><li>- Seeds near soil surface germinate next year</li><li>- Buried seed viable for many years</li><li>- Weeds in fields &amp; margins</li><li>- Herbicide resistant volunteers can reduce yields</li></ul>