



**AGRISoma**

**Carinata Summit 2017**  
**Update on Breeding Efforts in Carinata**

# Production of core experimental lines

Saskatoon labs → Crossing and production of 8,000 to 10,000 DH lines per year



**Northern Tier selection program**  
**Spring sown, long day**

**Southern Tier selection program**  
**Fall sown, short day**

Key selection nurseries:

- i) Outlook, SK, Canada
- ii) Temuco, Chile

Key selection nursery:

- i) Quincy, FL, U.S.A.

Objective: Screen 4-5K new DH lines per year

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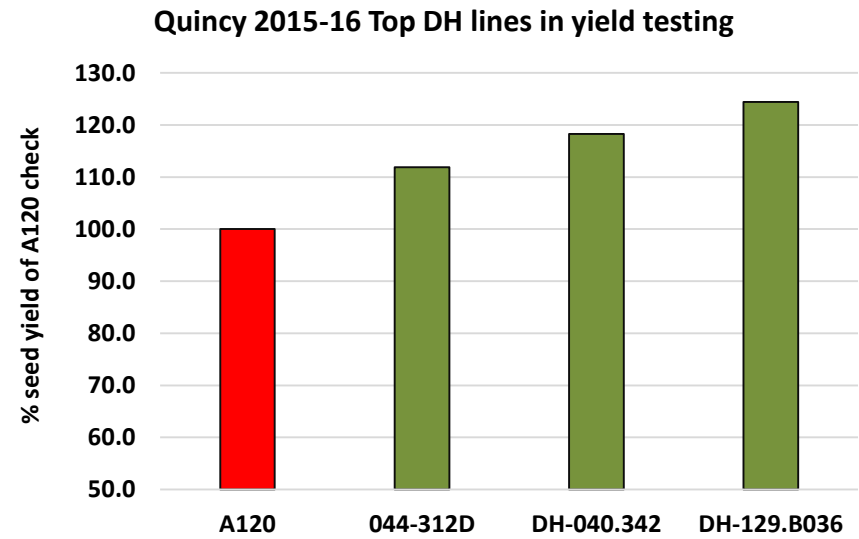
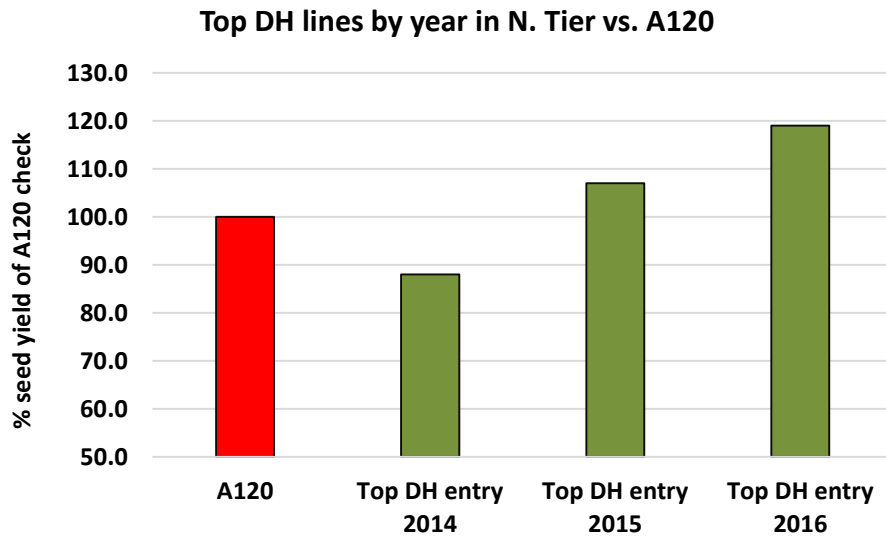
\*Used as an initial screening for yield trial selections in UY and S. America



**Basis for selections entering replicated yield testing in N. Plains (U.S.) and Canadian Prairies**

**Basis for selections entering replicated yield testing in Southeast U.S. and South America**

# Breeding efforts: Progress in yield potential



Also, strong inbred selections from '044' and '159' families observed in yield testing

# Traits of interest: Long pod types

## Chile 2016-17 Nursery

Cross #156



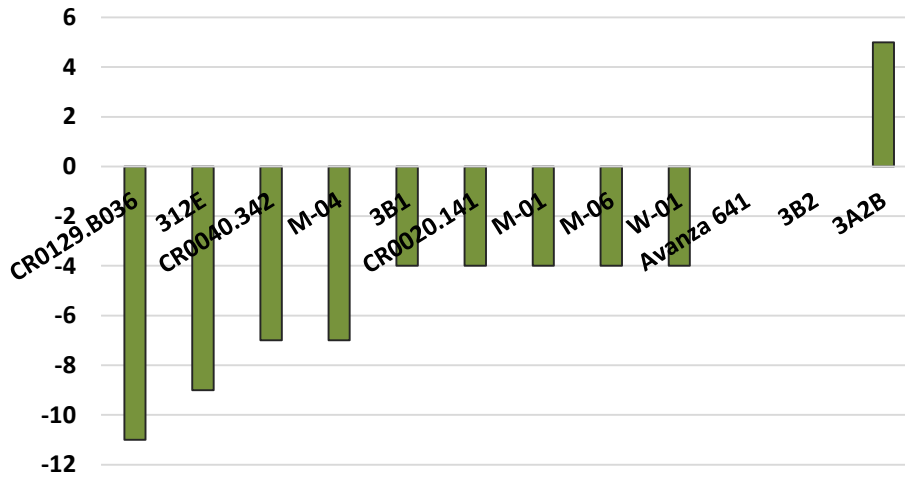
Cross #153



About 20% longer than nearby check

# Traits of interest: Earliness in short day environment

Days to Flowering vs. Avanza check, Quincy AYT



Quincy 2016-17 Advanced Yield Trial



**DH-129.B036: Top yielding DH line in preliminary 2015 – 2016 testing, SE and S. America**

**Earliest end of flowering: DH-129.B036**

## Test hybrid production and trials



Chile Test Hybrid production tent

### 2017 Test Hybrid trials:

- First 40 new entries to be tested
- 8 N. Tier sites
- Also planning to test in UY and S.E. US, 2017-18

### Development of hybrids in carinata:

- Genetically diverse set of female lines being developed
- Using Ogura cms system, proven in Brassicas
- Two Rf lines initially tested, now have seven additional improved Rf lines (AAFC developed)

# Marker discovery project: NAM phenotyping

Trait #	Traits of interest	Trait #	Traits of interest
	<b>In-field trait collection</b>		<b>In-lab trait collection</b>
1	Early vigor	20	Pod length
2	Leaf chlorophyll content	21	Seeds per pod
3	Days to flowering		
4	Days to end of flowering		<b>Post-harvest trait collection</b>
5	Flowering duration	22	TKW (1,000 kernel weight)
6	Petal colour	23	Seed colour - Visual scale
7	Bottom of pod canopy	24	Seed colour - White index scale
8	Top of pod canopy (plant height)	25	GLS - total
9	Canopy depth	26	Erucic acid - % of total fatty acids
10	Anthocyanin on stems	27	Seed oil content
11	Number of racemes	28	Seed protein content (whole seed)
12	Raceme length		
13	Branching angle		<b>Additional data</b>
14	Seed-bearing pods: Main raceme	A1	All drone data
15	Silique type	A2	All phone application data
16	Days to maturity: Pod maturity	A3	Any disease notes (e.g. <i>Sclerotinia</i> )
17	Lodging rating		
18	Pod shattering		
19	Plot yield		



Quincy increase of 3,300 inbred lines

## 2017 Phenotyping:

- Starting in May '17 in Saskatoon, SK
- First full phenotyping round in Quincy, 2017-18 season
- Making use of drone technology, comp sci application development etc.

## **Three priority projects for carinata crop protection improvement:**



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- 1. Development of herbicide tolerant carinata**
    - **ALS Group 2 herbicide resistance/tolerance**
    - **Dicamba tolerance**
  - 2. Development of improved frost tolerant carinata**
  - 3. Development of improved Sclerotinia resistance**



# 1) Herbicide Tolerance Program:

## i) Development of ALS tolerant carinata



ALS residue area of field

- Effort initiated in 2015
- Important for expansion of acres in winter rotation
- Anticipate first lines to be screened this fall

No ALS residue area

# 1) Herbicide Tolerance Program:

## ii) Dicamba resistance selections @ 8x rate



## Three priority projects for carinata improvement:

### 2) Development of improved frost tolerant carinata



**Tolerance at rosette to bolting stage (highest frost risk period as winter crop)**

#### Two approaches:

- 1) Screening variation in the diverse collection; tailored crosses for increased tolerance
- 2) Introgression from highly tolerant related species, using markers

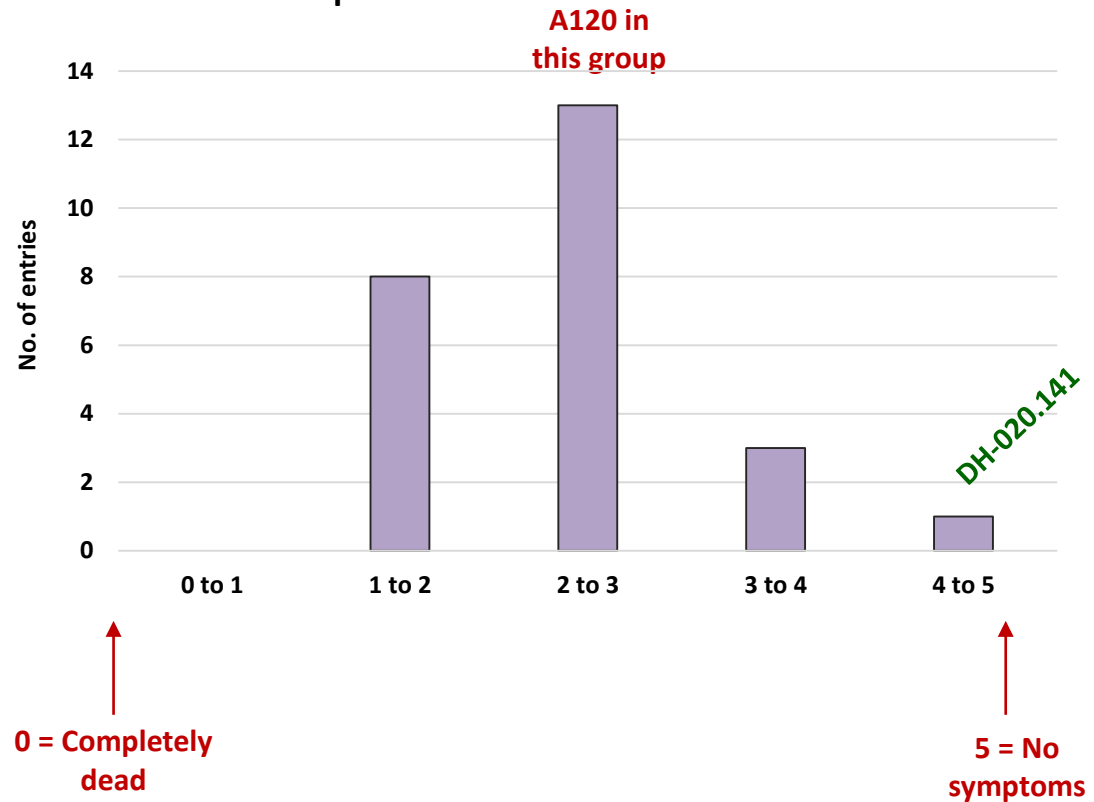
# Three priority projects for carinata improvement:

## 3) Development of improved sclerotinia resistant carinata



Heavily infected carinata

Average sclerotinia rating (0-5 scale) over four reps in W. Canada preliminary yield trial with heavy sclerotinia pressure



## Next steps: Breeding efforts

- Continue expanded germplasm screening in Florida winter nursery: 2015-16 = 1,668 rows focused on early maturity; 2016-17 = 2,150 rows focused on frost tolerance
- Continue to expand the variety testing program of nursery line selections SE US
- Expanded validation of germplasm in S. America yield testing: 2015 = 10 entries x 1 site; 2016 = 15 entries x 2 sites; 2017 TBD
- Phenotyping stage of molecular marker project underway this year at two locations (Saskatoon, SK, Canada; and Quincy, FL)
- Increased effort in developing and testing hybrids alongside OP (DH line) testing program
- Incorporation of key traits into elite backgrounds: Frost tolerance, sclerotinia resistance, ALS tolerance, etc.

