

MUSTARD HYBRIDS

**SASK MUSTARD
2018 AGM**

SASKATOON, SK

MUSTARD 21 CANADA Inc.

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January 11, 2018

Manage Destiny

Create the Future

Mustard Hybrids

- ❑ Background
- ❑ Hybrids 101 (*B. juncea*)
- ❑ Opportunity
- ❑ Value Chain ... Win : Win
- ❑ Future
- ❑ Need support

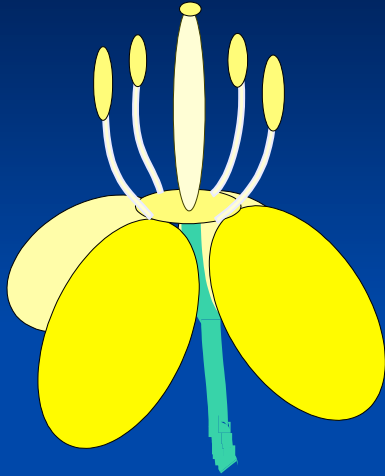
Background

- ❑ M21 ... 2009
- ❑ Mandate
 - ❑ Increase Yield
 - ❑ Create New Opportunities
 - ❑ Condiment mustard
 - ❑ Other applications
 - ❑ Production Agronomy - Manage Weeds
 - ❑ Non GMO
- ❑ “Canadian Advantage” to remain #1 Global Exporter

MUSTARD

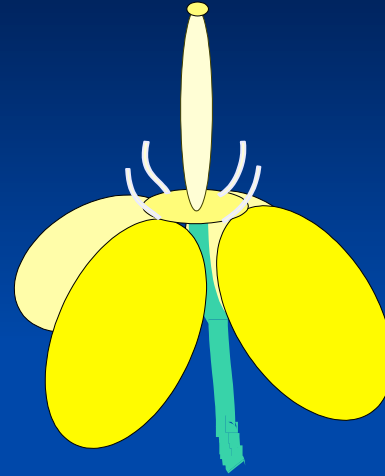
HYBRIDS 101

What Is A Hybrid?



Fertile Male (Pollinator)

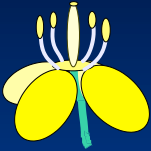
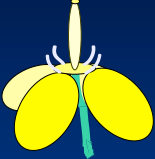
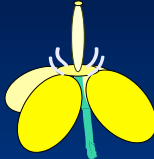
X



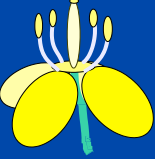
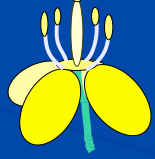
Sterile Female (A)

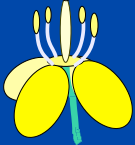
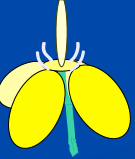

- Cross a sterile female parent with a fertile male parent to produce a hybrid with superior performance.

Making A Hybrid - 3 Parent Lines

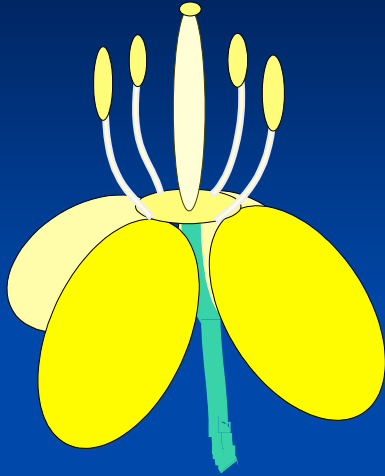
P LINE 1  X  = 
Maintainer (B) Female (A) **Sterile Female (A)**

P LINE 2  = 
Maintainer (B) **Maintainer (B)**

P LINE 3  = 
Pollinator (Rf) **Pollinator (Rf)**

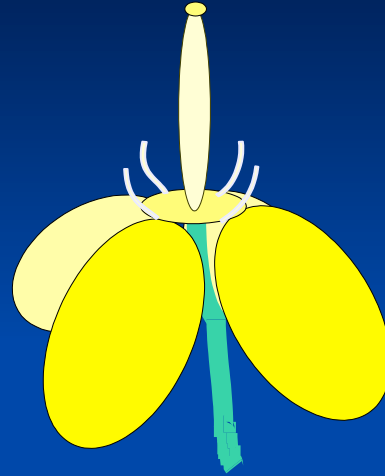
CREATE  X  =  **HYBRID SEED**
Pollinator (Rf) Sterile Female (A)

What Is A Hybrid?



Fertile Male (Pollinator)

X



Sterile Female (A)

- Cross a sterile female parent with a fertile male parent to produce a hybrid with superior performance.

Mustard Hybrid ... Advantage

- ❑ Hybrid vigour - Increase yield
- ❑ Consistent / Stable ... yield
- ❑ Broader diversity in parent lines ... larger hybrid vigour opportunity
- ❑ Protect variety ... R & D investment
 - ❑ IP infringement - Difficult
 - ❑ Mustard Value Chain needs to take this seriously

MUSTARD HYBRIDS (*B. juncea*)

TODAY ... REALITY

- ❑ **FIRST MUSTARD HYBRID VARIETY**
 - ❑ Nine years
 - ❑ Developed hybrid system
 - ❑ Lost two years – drought / water
 - ❑ **HYBRID CROPS TODAY vs. FIRST HYBRIDS**

MUSTARD VARIETY

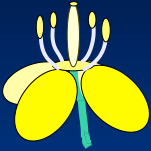
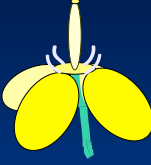
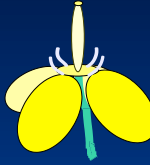
❑ OPEN POLLINATED vs. HYBRID

Certified Seed

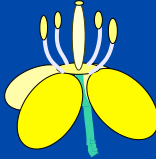
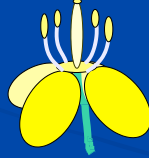
Open Pollinated vs. Hybrid

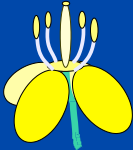
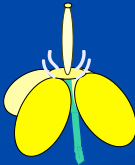
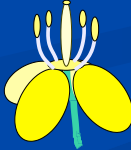
- To Get To The Same End Point i.e. Certified Seed
 - OP = 1 Breeder Seed Line increase
 - Hybrid = 3 Parent Lines to increase
 - A Line – Female
 - B Line – Maintainer
 - Rf Line - Pollinator

Making A Hybrid - 3 Parent Lines

P LINE 1  X  = 
Maintainer (B) Female (A) **Sterile Female (A)**

P LINE 2  = 
Maintainer (B) **Maintainer (B)**

P LINE 3  = 
Pollinator (Rf) **Pollinator (Rf)**

CREATE  X  =  **HYBRID SEED**
Pollinator (Rf) Sterile Female (A)

Certified Mustard Seed Production

■ Open Pollinated Production

- Start with Breeder seed
- 2 or 3 individual Increases ... 50,000 ac

■ Hybrid Seed Production

- Start with 100 grams of each parent line
 - A Line – Sterile Female
 - B Line – Maintainer
 - Rf Line - Pollinator
- Hybrid – 3 Individual Line Increases to achieve 50,000 ac
 - A line, B line, Rf line and finally “Certified Hybrid”



Input Comparison

■ 1 ac Brown Mustard OP

- ❑ Land, Crop Inputs, Rogueing, Standard Production Actions

■ 1 ac Brown Mustard Hybrid

- ❑ Land, etc. ... Same As Above, **plus**
- ❑ 2 planting operations, male & female
- ❑ Parent line trimming, male or female
- ❑ Daily Rogueing throughout flowering is critical
- ❑ Honey Bee Pollination - \$550/acre
- ❑ Male removal
- ❑ **Yield per acre is ~60%**

Hybrid Seed Production

- **Process is Technically Challenging**
 - Maintenance of pure parent lines
- **Process is Capital Intensive**
 - Specialized field operations
 - Quality Risk – isolation, volunteers
 - Pollination - \$550/acre
 - Inventory Risk - Cost
- **Critical to streamline operations, focus on activities to reduce cost/risk**

Brown Mustard Hybrid Launch

- ❑ **2019 – Pre Launch 5,000 acres**
- ❑ Large scale on farm experience
- ❑ Across mustard growing areas
- ❑ 160 acre maximum / grower
- ❑ Collect feed back on grower experience
- ❑ **2020 Full Launch 50,000 acres**
- ❑ Commercial availability
- ❑ Need to build Hybrid Seed inventory
- ❑ **Planning**
- ❑ **Starts Now 2018**

Hybrid Certified Seed Costs

■ Assumptions:

- Brown Certified (OP) Retail cost - \$ 2.25/lb.
- Market price Brown mustard seed =\$0.30/lb.
- Planting Seed rate = 6 lbs./ac
- Grower Share 50% of Increased Yield Value

ESTIMATED RETAIL BROWN MUSTARD CERTIFIED HYBRID SEED

Market Value Brown Mustard (BM) Yield /A = 900 lbs. x @ \$0.30/ lb.	\$270.00
Market Value from Hybrid Seed @ 20% increase Yield /A = 1080 lbs. x @ \$0.30/lb.	\$324.00
Extra \$ Value /A	\$54.00
EXTRA VALUE SHARED 50:50 (\$54.00)	
Grower 50% \$54.00 = \$27.00	\$27.00
Towards Hybrid Seed cost 50% = \$27.00 6 lbs. seeding rate (27/6 = 4.50)	\$ 4.50/lb.
Retail Brown Certified Seed \$2.25/lb.	\$ 2.25/lb.
RETAIL HYBRID SEED	\$ 6.75/lb.

Mustard Hybrid Timeline

- **Technology and Production System are Developed or in Development**
 - Brown Mustard – 2019
 - Synthetic Yellow – 2020
 - Oriental Mustard – 2021
- **Continuous Improvement Focus ...**
 - Yield
 - Cost
 - Quality

Mustard Hybrids

Create the Future Manage Destiny

- ❑ Background – Priority; KEY was/is Focus
- ❑ Success
 - ❑ First Brown Mustard Hybrid (*B. juncea*)
- ❑ Huge opportunity for future improvement
- ❑ Value Chain ... Win : Win
- ❑ Future is now brighter for staying competitive
- ❑ Need the Mustard Industry Value Chain to:
 - ❑ Get behind hybrid technology
 - ❑ Support Hybrid Certified Seed
 - ❑ Help maintain Canada's position as #1 exporter



THANK YOU
Comments
Questions?

MUSTARD