Secondary Dormancy Potentials of a Diverse Set of *Brassica napus* L. Lines Grown in Different Environmental Conditions

Caroline Brown[1,2]; Sally Vail[1], Steve Shirtliffe[2]

[1] Agriculture and Agrifood Canada, 107 Science Place, Saskatoon, SK

[2] Department of Plant Sciences, 51 Campus Drive, University of Saskatchewan, Saskatoon, SK

Introduction

- Volunteer canola is the 4th most prevalent weed on the Canadian prairies and creates issues for control in other rotational herbicide tolerant crops (Beckie, 2015)
- Secondary dormancy is the physiological mechanism leading to the extended presence of canola seed in the weed seed bank (Gulden et al., 2004)
- Dormancy is classified as the failure of a viable seed to germinate in favourable conditions
- Secondary dormancy is induced after the seed is released from the mother plant and is due to adverse conditions including low temperature and low moisture (Baskin and Baskin 1998)
- Secondary dormancy in *B. napus* exists as non-deep physiological dormancy, meaning the seed cycles between dormant and non-dormant states (Baskin and Baskin 1998)
- Stratification (cycling of light and/or temperature) can break non-deep physiological dormancy (Baskin and Baskin 1998)
- Induction potential for secondary dormancy varies greatly among *B. napus* lines and is largely influenced by the environment and genetics (Pekrun et al., 1997)

Objectives

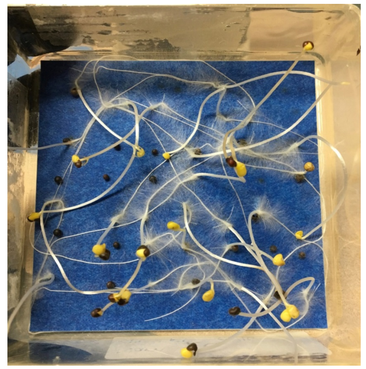
- Determine the secondary dormancy potential of a diverse set of *B. napus* L. lines grown in different seed growing conditions
- Hypothesized that among the 51 unique lines a wide range of secondary dormancy potentials will exist
- Hotter seed production sites will produce seed with lower secondary dormancy potentials
- Secondary dormancy potentials will later be used for correlation with seed vigour traits and seed storage protein profiles

Materials & Methods

Nested Association Mapping population (NAM) parental lines screened

- Spring (annual) *B. napus* L. lines
- Collection of 51 lines selected for their genotypic and phenotypic diversity
- Three maternal environments examined (2015 Saskatoon (SK); 2016 Temuco, Chile (1); 2016 Los Angeles, Chile (2))
- Immediately following harvest the seed lots are frozen to maintain highest level of dormancy
- Four technical runs are performed to screen for secondary dormancy

Rapid Dormancy Induction Protocol (Weber et al. 2006)
* step 1 and 2 done under greenlight (495-570 nm)



1) Dormancy induction

- Polyethylene glycol 6000 (PEG) (Calbiochem®, France) solution
  - Osmotic potential of -1.5 MPa at 20^0C
- 20^0C for 7 days in dark germination cabinet

2) Germination test

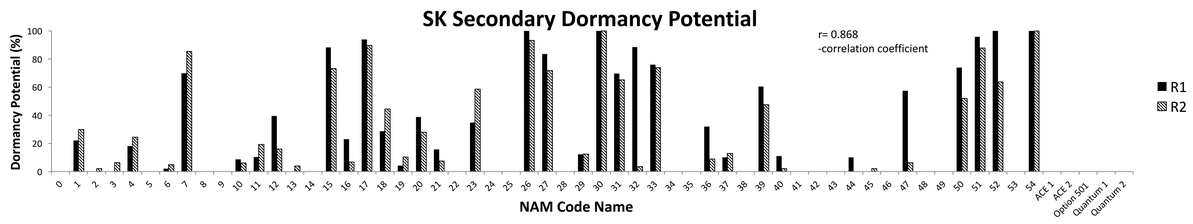
- 10 mL of distilled water
- 20^0C for 7 days in dark germination cabinet

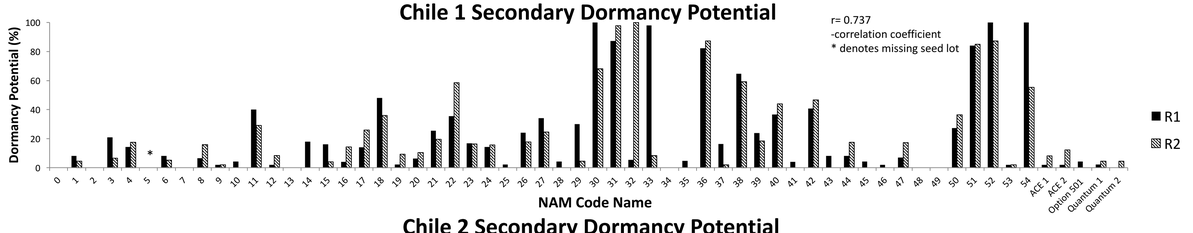
3) Viability test

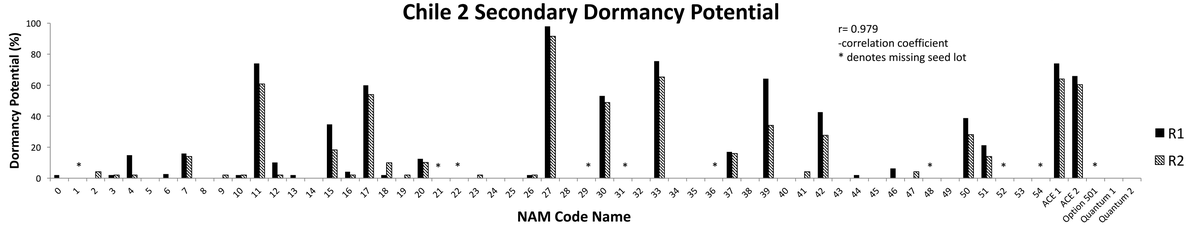
- 10 mL distilled water on top of blotter paper
- Temperature cycling 20^0C for 16 hours and 30^0C for 8 hours for 7 days in darkness

Dormancy potential = (# of non-germinated seeds/ total # of viable seeds) *100

Results







Conclusions and Future Research

- A wide range of secondary dormancy potentials were observed across maternal sites and lines
- Strong correlation coefficient between runs from the same maternal environment ($r > 0.7$)
- Some lines are not performing consistently between runs of the same environment (Ex. #32 SK; #36 SK; #47 SK)
- Some lines are not performing consistently across environments (Ex. #22 SK and Chile 1; #23 SK and Chile 1; #26 SK and Chile 1; #27 SK and Chile 1)
- Two more runs are in progress
- Seed vigour traits to be examined include, germination potential, precocious germination, electrical conductivity, controlled deterioration and pre-chill germination
- Seed storage proteins (SSP), napin and cruciferin, are to be profiled
- Secondary dormancy potentials used for correlation with seed vigour traits and seed storage protein profiles

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Map of Chile. 2016. Accessed from https://www.google.ca/maps/Chile

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