

Is it possible to breed a delicious winter hardy garden pea for most of Ontario and eastern Canada?



Farmer-Researcher

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Project Timeline:
May 2018 - 2020/2022

In A Nutshell

Duane would like to breed a pea that can be planted in the fall and yield early peas, before the heat and drought set in. He'd like to see early production of high quality peas to supply market gardeners and backyard gardeners without the struggles of early spring planting.

Progress to Date:

This breeding project should take 3-5 years to get uniform lines with the combined traits of winter hardiness and quality, which are both complex traits.

Varieties derived from this project will be released publicly as per the Breeders Pledge (below). If deemed commercially viable, the resulting varieties will also be licensed to small seed companies.

METHODS

Breeding goal

To breed a winter hardy, quality garden pea.

Summary

Table 1	
Timeline for pea breeding	
Breeding Task	Detail
Cross parental types	Winter/spring 2018
Grow crossed progeny (F1)	Summer 2018
Grow first segregating generation (F2)	2018/19
- Select for winter hardiness	Peas that survive!
- Select for plant type	With/without tendril leaves
- Select for seed quality	Non-starchy, colourless pericarp
Grow selected progeny lines (F3)	2019/2020
- Reselect as necessary	As above
Evaluate selected lines (F4)	2020/2021
Release to other growers and gardeners	2022+

PROGRESS TO DATE

Crossing Peas

- Duane used growth rooms at University of Guelph for crossing over winter/spring
- He chose **winter hardy types as male** parent (round/starchy, coloured flower/pigmented seed coat, tendril leaf type) and **garden pea type as female** (wrinkled/sweet, white flower/clear seed coat, normal leaf type)
- Starchy is a dominant trait that Duane can use to confirm F1 seeds were crossed vs self-pollinated.
- 20 crosses successfully produced seed

Growing Crossed Progeny, F1

- Planted at uniform spaces to identify individual plants
- 20 crosses planted in field, 5 seeds/cross
- Compared plant type with female/male parents
- Grew parents in adjacent area
- Harvested pods as they ripened
- Threshed dry pods
- Checked seed for segregation



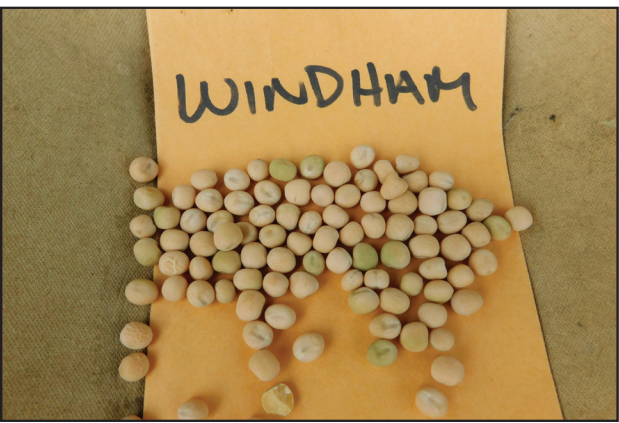
Top from left: Male parents Sepector and Windham.
Bottom from left: F1 crosses with Spector and Windham.

Growing Segregating F2

- Progeny planted in field as spaced plants
 - 11 populations planted in Fall 2018
 - 3 sets of paired crosses with both winter parents
- Parents planted to check winter hardiness
- Rye as support system



Left: Crossed seed in growth room.
Right: Rows of F2 progeny interplanted with rye for support next spring.



Seeds of winter pea male parents used in crossing



Top: Pods showing segregation for colour and seed shape.
Bottom: Threshed seed showing segregation for colour and shape. NB: Spector has a pigmented seed coat and crossed seed also shows this dominant genetic trait.

NEXT STEPS

- Wait for spring and select what is still alive!
- Also select for plant type; and harvest and select for seed type.
- Over the next four winters, continue planting and selecting until a uniform line is produced!

Breeder's Pledge

I have the freedom to use the seeds generated from my farmer-led research project in any way I choose. In return, I pledge not to restrict others' use of these seeds or their derivatives by patents or other means, and to include this pledge with any transfer of these seeds or their derivatives.