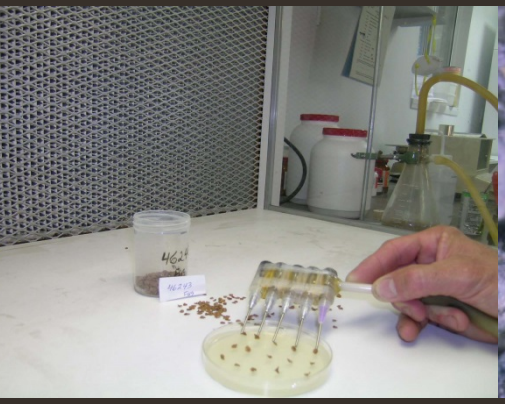
Fungal Assay Program History



Dave Kolotelo

Connections Through Seed

October 2018

Special Thank you to Michael Peterson *(Applied Forest Sciences Ltd.)* for providing pathology services to the TSC and BC for the past 25+ years

Michael also recently received the Green Timbers Award for his contributions to reforestation in BC

CONGRATULATIONS

and enjoy your retirement

Fungal Assay Program History

- 1985 to 2000 – Forest Pest Clinic at Pacific Forestry Centre (PFC) was the foundation for the current program
- 1992 – large program (877 seedlots) to perform tree seed bioassays for Fusarium by PFC – **John Dennis**
- 1993 to 2000 – Fungal Assays performed on contract by AFS (1997 to 1999 MOF assisted in program funding)
- 2000 – Forestry Nursery Health Clinic closed
- 2001 – AFS operating pest clinic on a fee-for service basis (2003 – FGC (PMTAC) funded the fungal assays)
- 2017 –MOU with Ministry of Agriculture Plant Health Clinic to perform services – **Vippen Joshi / David Trotter**
- Funding from TSC base budget (~ $6000 per year currently and up to $25 000 when dealing with backlog)

A Few Highlights

- **1994** – Sample sizes determined (95% confidence level)
  - *Caloscypha fulgens* - 250 seed to detect 5% ± 2.5%
  - *Fusarium* spp. - 500 seeds to detect 5% ± 2.0%
  - *Sirococcus conigenus* - 1500 seeds to detect 1% ± 1.0%
- **1996** – Seed Pathology Meeting
    - Paige Axelrood
    - John Dennis
    - Dave Kolotelo
    - Melody Neumann
    - Michael Peterson
    - David Trotter
  - Established Fungal Assay priorities

Species	Caloscypha	Fusarium	Sirococcus
BA	Medium	Medium	Low
BL	**High**	**High**	Low
CW	Low	Low	Low
FDC	Low	High	Low
FDI	Low	Low	Low
HW	Low	Medium	Low
LW	Low	Medium	Low
PLI	Low	Low	Low
PW	Low	**High**	Low
PY	Low	**High**	Low
SS	**High**	**High**	**High**
SX	**High**	**High**	**High**
YC	Low	Low	Low

Those initial priorities formed the foundation for the program there have been some ‘minor’ adjustments over time (in pink)

– Fusarium media question?

Komada	Nash & Snyder
2067 tests already using this media	New media type, would be a different test
Specifically for *F. oxysporum*, but others also show up	More general to all Fusarium
Trichoderma may mask Fusarium	
Experienced with this media	Need to develop expertise

- We voted and Komada won – primarily # tests to date

– Dry vs. stratified test results?

Dry	Stratified
2067 tests already performed dry	Would be new
More reproducible results **No Timing constraints**	Slight MC differences may impact test Stratification duplication complicates test
Consistent material	High variability in bulking up rates
Better baseline	**Possibly better correlation with disease incidence in nursery**

- Dry testing won - # tests to date & reproducibility

– Critical Levels for each Pathogen (significant problem)

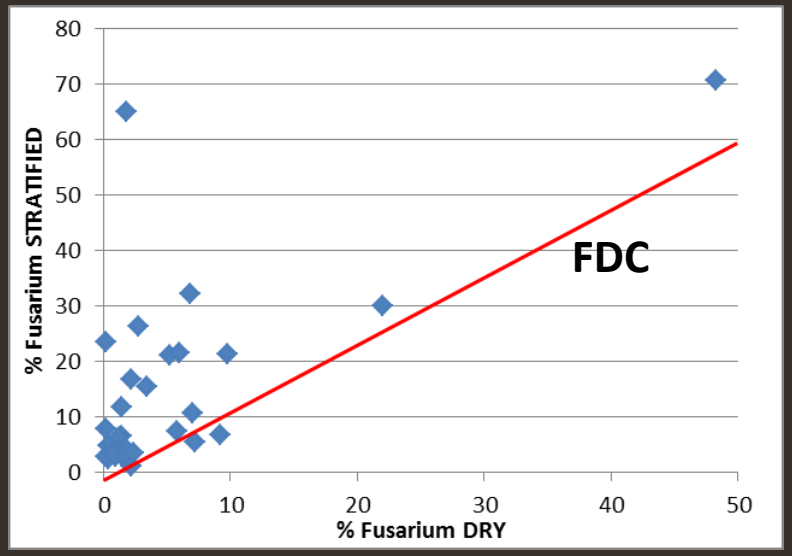
- 5% for *Caloscypha* – *pathogen can bulk-up in stratification*
- 1% for *Sirococcus* – *found on SX can then infect Pli, Py*

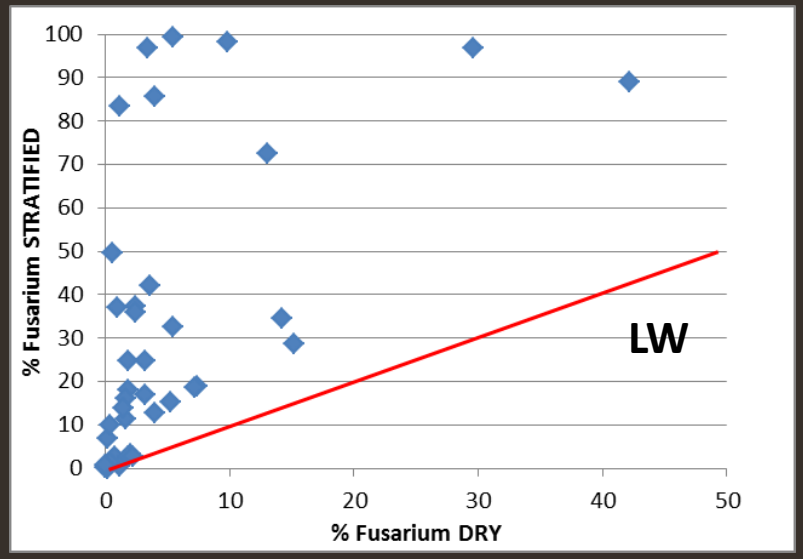
- Fusarium not as simple – 5% agreed to … eventually

- Assay doesn't differentiate % of different Fusarium species

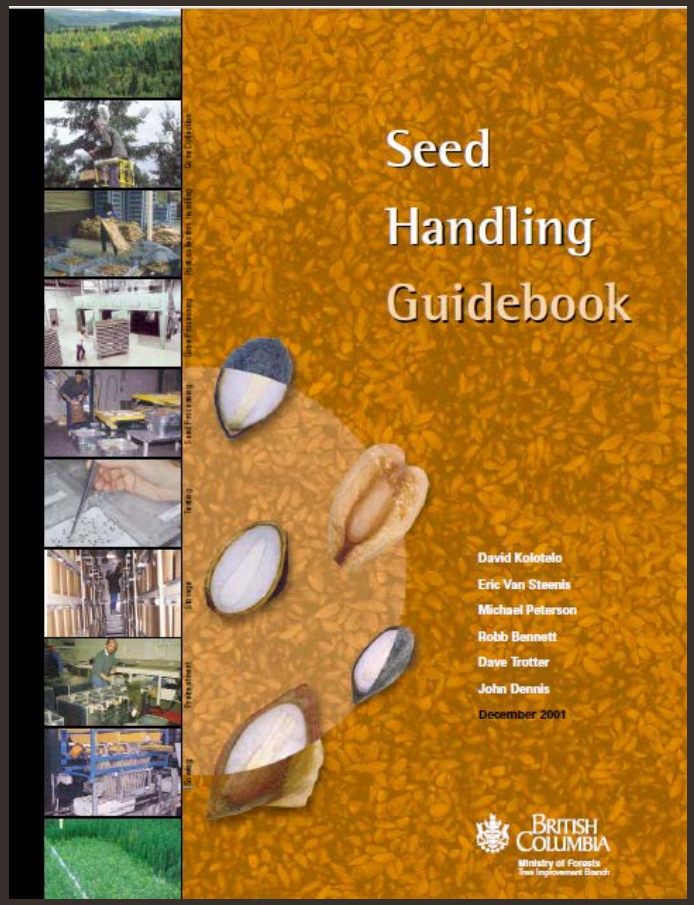
(species testing was cost prohibitive 20 years ago)

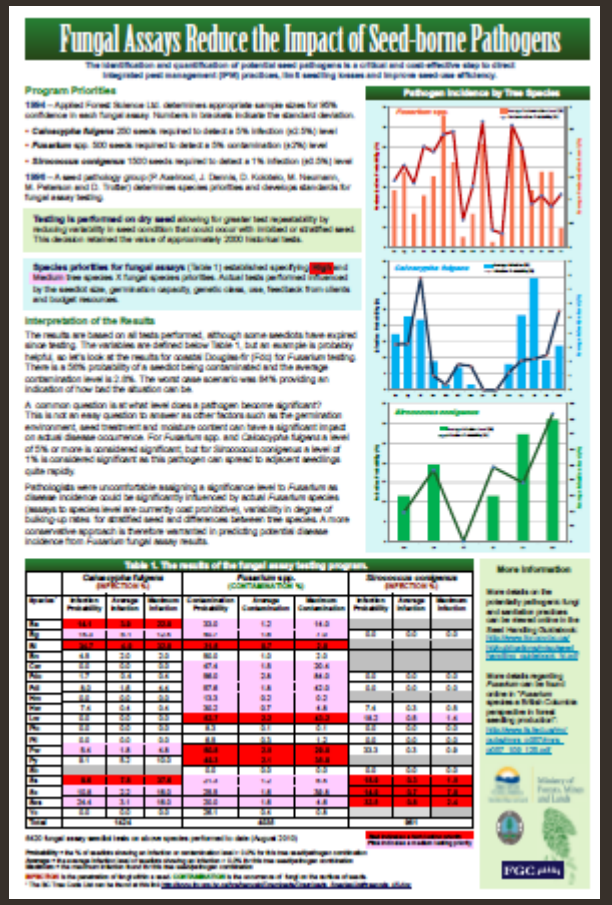
- Bulking-up (dry to stratified) % Fusarium is highly variable





Extension Efforts





- https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed/tree-seed-centre/cone-seed-improvement-program
- https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/tree-seed/tree-seed-centre/tsc_fungal_assay_poster_2010.pdf
- Upcoming Tree Seed Working Group News Bulletin article

Disease Incidence Feedback Loop

- FDC root rot issues at some nurseries
  - *Fusarium* spp.
    - Seed-borne
    - Air, water, media- borne
  - *Pythium* spp.

Proposed Program Changes

- Eliminate *Sirococcus conigenus* testing
- Remove requirement to identify companion fungi
  - not on SPAR, many fungi not pathogens
  - Possible exceptions include :
    - *Pythium*
    - *Phomopsis* (LW)
    - Cylindrocarpon
- Investigate development of media-less direct PCR assay to identify *Fusarium* to the species level