



Cone and Seed Improvement Program BCMof Tree Seed Centre

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Fungal Assay Update

The BC Ministry of Forests and Range Tree Seed Centre (TSC) continues to fund a fungal assay program as a critical and cost-effective step to direct integrated pest management (IPM) practices and improve seed-use efficiency. Information regarding the presence of a pathogen and its contamination or infection levels should influence seed sanitation, sowing and germination practices.

The results are presented in Table 1 based on all 6427 tests performed, although some seedlots have expired since testing. To conserve table space, the BC species codes are used to identify species¹. The cells identified in **Red** indicate a High testing priority and **Pink** indicate a Medium testing priority, all other are low priorities without additional additional information. Variables presented are described below with an emphasis on differentiating pathogens that are contaminants of the seed coat (*Fusarium* sp.) that can be reduced through surface seed sanitation techniques and the pathogens which are infections (*Caloscypha* and *Sirococcus*) in which other IPM practices need to be employed. Below is a definition of the column headings.

#T = the number of tests performed for this tree seed/pathogen combination

MeanI / MeanC = the average infection/contamination of ALL tests performed for this tree seed*pathogen combination

%I / %C = the % of seedlots showing an infection or contamination level > 0.0% for this tree seed*pathogen combination

AVEI / AVEC = the average infection level of seedlots showing an infection/contamination > 0.0% for this tree seed*pathogen combination

MaxI / MaxC = the maximum infection/contamination found for this tree seed*pathogen combination

I think it is important to present several variables as only the mean of all tests or the average of tests > 0.0% only presents part of the story. The terminology used can be confusing, so an example is probably helpful. Let's look at the results for coastal Douglas-fir (Fdc) for *Fusarium* testing. There have been 459 tests performed with a 1.6% average level of *Fusarium* estimated. The probability of a seedlot being contaminated is 56.0% and for those contaminated seedlots, the average contamination level is 2.8%. The worst case scenario was an 84.0% contamination level providing an indication of how bad the situation can be.

A Common question is at what level is a fungal assay result significant? This is not an easy question to answer as other factors such as the germination environment, seed treatment and moisture content can have a significant impact on actual disease occurrence. For *Fusarium* spp. and *Caloscypha fulgens* a level of 5% or more is considered significant, but for *Sirococcus conigenus* a level of 1% is considered significant as this pathogen can spread to adjacent seedlings quite rapidly. Pathologists were less comfortable assigning a specific significance level to *Fusarium* as disease incidence could be significantly influenced by actual *Fusarium* species (assays to species level are currently cost prohibitive), variability in bulking-up rates for stratified seed and differences between tree species. *Fusarium* levels under 5% can still lead to diseases under specific conditions and greater due diligence on a seedlot level is required with this pathogen.

¹ The BC Tree Code List can be found at this link

http://www.for.gov.bc.ca/hre/becweb/Downloads/Downloads_SpeciesList/treecode_45.doc

Table 1. Results of the BC Ministry of Forests and Range, Tree Seed Centre fungal assay program (Active and Expired seedlots).

Sp.	<i>Calosypha fulgens</i> (INFECTION)					<i>Fusarium</i> spp. (CONTAMINATION)					<i>Sirococcus conigenus</i> (INFECTION)				
	#T	MeanI	%I	AveI	MaxI	#T	Mean	%C	AveC	MaxC	#T	MeanI	%I	AveI	MaxI
Ba	199	0.5	14.1	3.9	22.0	270	0.4	33.0	1.2	14.0					
Bg	42	0.7	14.3	5.1	12.4	59	0.7	40.7	1.6	7.0	1	0.0	0.0	0.0	0.0
Bl	202	1.7	34.7	4.9	32.8	237	0.2	31.6	0.7	2.8					
Bn	22	0.1	4.5	2.0	2.0	22	0.5	50.0	1.0	2.0					
Cw	4	0.0	0.0	0.0	0.0	289	0.7	47.4	1.5	20.4					
Fdc	59	<0.1	1.7	0.4	0.4	459	1.6	56.0	2.8	84.0	4	0.0	0.0	0.0	0.0
Fdi	137	0.1	8.0	1.6	4.4	573	1.1	57.6	1.8	42.0	6	0.0	0.0	0.0	0.0
Hm	9	0.0	0.0	0.0	0.0	30	<0.1	13.3	0.2	0.2					
Hw	54	<0.1	7.4	0.4	0.4	169	0.2	30.2	0.7	4.8	81	<0.1	7.4	0.3	0.5
Lw	16	0.0	0.0	0.0	0.0	225	1.4	62.7	2.2	43.2	44	0.1	18.2	0.5	1.4
Plc	5	0.0	0.0	0.0	0.0	12	<0.1	8.3	0.1	0.1	7	0.0	0.0	0.0	0.0
Pli	51	0.0	0.0	0.0	0.0	538	<0.1	6.5	0.3	1.2	22	0.0	0.0	0.0	0.0
Pw	92	0.1	5.4	1.8	4.8	125	1.5	60.8	2.5	29.0	3	0.3	33.3	0.3	0.9
Py	22	0.5	9.1	5.2	10.0	213	1.0	49.3	2.1	35.8					
SS	83	0.8	9.6	7.8	37.6	94	0.3	21.3	1.2	6.4	95	0.1	18.9	0.3	1.5
Sx	380	0.2	10.8	2.2	16.0	652	0.4	25.5	1.6	39.8	657	0.1	14.9	0.7	7.8
SxS	41	0.8	24.4	3.1	16.0	40	0.3	20.0	1.6	4.6	40	0.3	32.5	0.8	2.4
Yc	6	0.0	0.0	0.0	0.0	23	0.1	26.1	0.4	0.8					
Total	1424					4040					963				

6427 fungal assayseedlot tests performed to date (2010)

David Kolotelo, RPF
 Cone and Seed Improvement Officer
 Dave.Kolotelo@gov.bc.ca
 (604) 541-1683 extension 2228