



Cone and Seed Improvement Program BCMoF Tree Seed Centre

from Seed and Seedling Extension Topics
Volume 10 1997



Fungal Assay Results

The testing of seedlots for seed-borne pathogens has been occurring since 1991 with 3667 tests being performed for the three most significant pathogens: *Caloscypha fulgens* [seed or cold fungus]; *Fusarium* sp. [that may cause damping-off or root rot] and *Sirococcus conigenus* [Sirococcus blight]. The results of these tests are currently available on SPAR (Seed Planning and Registry System) and electronic or hard copies may be obtained by contacting the Tree Seed Centre. This note is intended to provide a summary of the current status of fungal assay testing and promote the use of these figures in planning. Fungal assays are important for seed owners to understand the disease potential of seedlots they own and possibly correct problems related to collection or post-collection handling methods. For nurseries the fungal assays indicate seedlots which may cause diseases and may benefit from seed treatments such as those discussed by Dave Trotter in his article on hydrogen peroxide treatments. The status of fungal assay testing is presented in Table 1. Species are abbreviated in Table 1, but common names can be found in the article on 'Germination Retest Frequencies' in this volume. Column headings are explained here for simplicity:

- ◆ [#T] is the total number of tests performed by host/pathogen combination
- ◆ [%T] is the % of seedlots tested ;
- ◆ [%I] is the percentage of seedlots tested showing a infection > 0.0% ;
- ◆ [Ave] is the mean infection % of infected seedlots ; and
- ◆ [MaxI] is the maximum infection % of tested seedlots.

The fungal assay result are intended to identify seedlots which are infected with seed-borne pathogens that may result in disease occurrence in the nursery. The % of seedlots showing an infection [%I] indicates the probability or risk of encountering a seedlot infected with a pathogen (e.g. Fdc - coastal Douglas-fir has a 67% probability of being infected with *Fusarium*). The average infection % indicates the severity of infection as the proportion of seeds harboring the pathogen. This value allows one to assess how infected individual seedlots are in relation to the species average. The maximum infection% indicates the worst-case scenario for each species/pathogen combination.

Table 1. The current situation of fungal assay testing.

Sp.	Caloscypha fulgens					Fusarium sp.					Sirococcus conigenus				
	#T	%T	%I	Ave	MaxI	#T	%T	%I	Ave	MaxI	#T	%T	%I	Ave	MaxI
Ba	64	28	13	0.9	2.0	180	78	33	0.8	11.					
Bg						49	84	37	1.3	7.0					
Bl	73	45	42	2.6	9.6	239	87	24	0.9	14.					
Cw						112	41	71	1.8	20.					
Fd	70	21	1	0.4	0.4	284	84	67	2.3	75.	4	1	0	0.0	0.0
Fdi	98	17	7	1.0	4.4	266	45	85	2.1	19.	6	1	0	0.0	0.0
H						12		17	0.2	0.2					
Hw	49	15	6	0.4	0.4	76	23	43	0.8	4.8	92	27	12	0.5	1.6
Lw						153	94	79	2.8	43.	2	1	100	0.9	1.4
Plc	4	8	0	0.0	0.0						6	12	0	0.0	0.0
Pli	32	2	0	0.0	0.0	488	33	6	0.3	1.2	10	1	0	0.0	0.0
Pw						42	37	79	1.7	5.8					
Py	3	2	0	0.0	0.0	90	58	71	1.9	9.8					
SS	13	7	31	14.	37.6	8	4	38	1.7	4.0	28	14	21	0.3	1.1
Sx	18	15	24	2.2	16.0	442	41	35	1.8	39.	47	39	25	0.7	3.6
Sx	2	4	10	1.1	1.8	1	2	10	3.8	3.8	14	29	29	0.6	1.0
Yc						3	5	33	0.2	0.2					
	58		17	2.5	37.6	244		44	1.9	75.	63		23	0.7	3.6

The obvious question is "What infection level is significant?" and the answer is less than satisfying as actual occurrence of disease symptoms will very much depend on the environment in which the crop is grown and the sowing pre-treatment. A seedlot may have a 100% infection, but not produce disease at all in the nursery, while at another nursery a much lower infection rate may result in disease occurrence. The situation is even more complex for *Fusarium* assays as results are only to the genus level, although individual species may or may not be pathogenic to conifer tree seeds. Rather than supplying strict guidelines on importance I am suggesting that if you have had disease problems at the nursery then check the fungal assay results and determine what level is critical at your nursery. If you have had a disease problem and no fungal assay information is available then please contact me and we will have the seedlot tested. The priorities for fungal assay testing are presented in Table 2. These priorities were prepared by discussions among the following people: Paige Axelrood, BC Research; John Dennis, Forestry Canada; Melody Neumann, ECOS Biological Consultants (currently working on her PhD in Australia); Mike Peterson, Applied Forest Sciences; Dave Trotter, Nursery Extension Services and myself.

Table 2. The priorities for fungal assay testing by pathogen and tree species.

Species	Caloscypha	Fusarium	Sirococcus
Ba	Medium	Medium	Low
Bg	Low	Low	Low
Bl	High	High	Low
Cw	Low	Low	Low
Fdc	Low	High	Low
Fdi	Low	Low	Low
Hw	Low	Medium	Low
Lw	Low	High	Low
Plc	Low	Low	Low
Pli	Low	Low	Low
Pw	Low	High	Low
Py	Low	High	Low
SS	High	High	High
Sx	High	High	High
SxS	High	High	High
Yc	Low	Low	Low

The fungal assay results are based on dry seed as the results are more reproducible than with stratified seed and stratification regimes may vary by nurseries performing their own seed pretreatment. The results are intended to identify seedlots that are infected with seedborne pathogens. In the future we hope to add the test results to our sowing request labels to allow this information to be available with the seed and avoid having to cross-reference lists.

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