



PEST REPORT

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Seedling Mortality Caused by *Rhizina* Root Disease Prince Rupert Forest Region, 1989

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For the second consecutive year, *Rhizina* root disease, *Rhizina undulata*, was linked to seedling mortality in young plantations, primarily in the Coastal Western Hemlock and Interior Cedar-Hemlock biogeoclimatic zones of the Prince Rupert Region. Most of the mortality occurred in 1989 plantations (see table) but some additional mortality was also seen in plantations reported damaged in 1988. The range, incidence and intensity of infections was greater in 1989 than in 1988. Mortality was recorded from 24 plantations and ranged from 1% - 74% (avg. 23%)¹ of the newly planted seedlings. Host species in descending order of frequency of infection (though not necessarily susceptibility) included lodgepole pine, spruce spp. (white, hybrid and Sitka), western hemlock and western red cedar.² On sites with steep slopes or varied terrain, the most severe mortality was found on the high, drier and warmer parts of the block which often corresponded to the areas planted with lodgepole pine.

In the Kispiox TSA, all areas broadcast burned in the fall of 1988 and planted in the spring of 1989 supported *Rhizina* root disease infections. In the Kalum TSA, every 1988 burn south of Spruce Creek in the Bell Irving Valley was infected, but no infections were seen in recent burns further to the north. To the east, only two of seven 1989 plantations were affected at the extreme western edge of the Bulkley TSA, one of four examined in the Lakes TSA, and of six 1988 burns examined in the Morice TSA, none were infected.

¹Derived by averaging mortality within each host species, but data was not weighted according to the relative proportion of each species in any one plantation.

²First time *Rhizina* root disease found associated with western red cedar in B.C.

Locations and severity of infections by Rhizina root disease in 1989 plantations, Prince Rupert Forest Region, 1989.

TSA	Location	Biogeoclimatic ¹ zone	Host	Percent seedlings ²			
				dead	alive/infected	healthy	
Kalum	<u>Nass River drainage</u>						
	Hwy 37, 38 km S of Meziadin	ICHmc2	1P	69	0	31	
				sS	21	12	67
	Lavender Creek Road Km 10	ICHmc2	sS	15	14	71	
				1P	24	7	69
	Lavender Creek Road Km 14		1P	57	16	27	
	Kwintahl Road, Goat R. br.	ICHmc2					
	Km 0.6		1P	32	12	56	
				sS	35	13	52
	Km 1.3		1P	61	40	0	
				sS	25	25	50
	Km 3		1P	55	12	33	
	<u>Skeena River drainage</u>						
	Hwy. 16, Little Oliver Cr.	ICHmc3	1P	14	6	80	
				sS	0	3	97
	Km 16 Williams Cr. Rd.	CWHws2	wH	29	8	63	
				wrC	0	0	100
	Little Cedar River	CWHwsl	wH	54	8	32	
	Branch 77 road Km 9 spur	CWHwsl	wH	2	2	96	
				wrC	13	0	87
	Lakelse River road	CWHwsl					
	km 8.5 spur		wH	72	2	26	
				sS	43	43	14
	km 14		wH	74	6	20	
				sS	34	28	38
				wrC	20	0	80
	Kispiox	Mile 30 Kispiox CP 342	ICHmc3	wS	26	7	67
Blk. 40							
Nangese Main CP 328 Blk. 31		ICHmc3	1P	1	1	98	
Nangese Main CP 328 Blk. 33		ICHmc3	1P	3	2	95	
Sweetin Main CP 320 Blk. 14		ICHmc3	1P	2	0	98	
Corral Creek CP 347 Blk. 54		ICHmc3	1P	37	23	40	
Corral Creek CP 347 Blk. 55		ICHmc3	1P	30	18	52	
				wS	24	15	61
Bailey Main CP 338 Blk. 47		ICHmc3	1P	18	12	69	
Bush Main CP 331 Blk. 24		ICHmc3	1P	26	16	58	
				wS	8	4	88
Burdick Creek CP 100 Blk. 8		ICHmc3	wSwC	2	0	98	
Bulkley	Trout Creek CP 350 Blk. 1	ICHmc2	1P	35	27	38	
				wS	2	2	96
	Trout Creek A129943	ICHmc2	wS	4	5	91	
Lakes	Ootsa Lake, Square L. Rd.	SBS dk	1P	13	6	81	
	93F0710008						

- 1 ICHmc2: Interior cedar hemlock, moist cold, Upper Nass Basin
ICHmc3: Interior cedar hemlock, moist cold Lower Nass Basin
CWHws2: Coastal western hemlock, wet subarctic, montane
CWHws1: Coastal western hemlock, wet subarctic, submontane
SBS dk: Sub boreal spruce, dry cool

2 Number of dead seedlings includes those confirmed and presumed killed by Rhizina. Confirmation was not possible in many cases because of the difficulty of identifying microscopically Rhizina undulata mycelium in direct association with tree roots. Some small percentage of the mortality was probably due to undetermined site and stock factors.

Plantations reported infected in 1988 (refer to: Forest Insect and Disease Conditions, Prince Rupert Forest Region, 1988) sustained additional damage in 1989, the most dramatic being a single plantation at Guess Creek (CP 321, Blk. 1) in the Morice TSA, where primarily lodgepole mortality increased from 6% to 23%. Observations during past and present periods of infection indicate that the limit of mycelial colonization of the site by the fungus was reached during the first year following the burn. Most seedlings that died in the second year became infected during the initial colonization period, and succumbed to the disease and/or secondary agents, which were pathogenic due to the weakened condition of the seedlings.

Where they have occurred, mass fruitings of Rhizina in forest situations have always followed wild fires or prescribed burns, since the generated heat greatly increases the frequency of spore germination and temporarily eliminates competing organisms from the site (J. Ginns 1968). Rhizina fruits from early summer through to fall frost, a minimum of four months following a burn, and since it is a poor competitor the fungus normally survives for only a few years after the burn after which it is succeeded by more aggressive fungi.

Observations in currently infected plantations tend to support these earlier observations, though in a single plantation on Corral Cr. (CP 314 Blk. 2) Kispiox TSA, an opening burned in 1986 and first infected in 1987 continued to cause light mortality (+2% of wS) in 1989. The site was replanted in June with lodgepole pine and many of these (+10%) planted adjacent to dead spruce subsequently died during the summer.

As long as broadcast burning is employed as a silvicultural tool, the risk of infections due to Rhizina will remain. An abundance of fruiting bodies produced in 1989 has ensured an abundance of inoculum to infect burned 1990 plantations. Barring a prolonged spring and summer drought ^{in addition to unusually cold} or ~~unusually cold~~ weather coupled with low snow levels, infections are expected to continue at ^{similar or increased levels in 1990.} ~~similar or increased levels in 1990.~~ ^{due to fungal spore}

→ germination and mycelial growth.