A SURVEY OF FUNGICIDAL TOLERANCE OF BOTRYTIS CINEREA IN BRITISH COLUMBIA CONTAINER NURSERIES

by

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ABSTRACT:

A survey of British Columbia container nurseries, both Provincial and private, was conducted to assess the tolerance of *Botrytis cinerea* populations to the commonly used fungicides Benlate, Bravo 500 and Captan. The concentrations of fungicides used in this survey were the recommended rates from the Nursery Production Guide 1984. Tolerance was based on evidence of *B. cinerea* growth. No tolerance to Captan was found in any of the tested isolates. Variable tolerance was found throughout the province to the other two fungicides. Isolates from four nurseries showed a high level of tolerance to both Benlate and Bravo 500. Low tolerance to these fungicides was found in isolates from two nurseries. Of all isolates tested, 74% showed tolerance to Benlate and 60% showed tolerance to Bravo 500. High tolerance to fungicides was noted in isolates from Douglas-fir, spruce and western red cedar. The high level of tolerance to Benlate and Bravo 500 found in B.C. nurseries indicates that the populations of *B. cinerea* are becoming tolerant to the fungicides used to control them.

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INTRODUCTION:

Botrytis cinerea, (Fr.) Pers., the cause of gray mould of conifer seedlings, has become an important pest in container nurseries. This fungus has a wide host range, being particularly damaging to Douglas-fir (*Psuedotsuga menziesii* Mirb. Franco) and western hemlock (*Tsuga heterophylla* (Raf.) Sarg.). The pathogen may either kill seedlings, or cause damage that results in a higher number of culls.

Gray mould symptoms first appear on

seedlings in late summer or early fall and can continue until the stock is outplanted. Lower dead or senescent needles, or those damaged by fertilizer or frost, are usually infected first, resulting in moulding and needle mortality. The disease may spread upwards to the leader, inwards to the stem or to other seedlings. Brown lesions often appear on the stems of diseased seedlings as well as the gray-brown mycelial growth. *B. cinerea* overwinters as mycelium or sclerotia in plant debris. These can serve as a source of inoculum for in the next season, when condiospores are drawn into the greenhouse ventilation system (Sutherland and Van Eerden 1980).

Control of *B. cinerea* may be by cultural or chemical methods. The spread of *B. cinerea* is facilitated by cool humid conditions, as well as crowding of seedlings. Cultural control methods include lowering humidity by reducing irrigation, improving greenhouse ventilation and controlling seedling density.

Chemical control of *B. cinerea* is achieved through the use of both protectant and eradicant fungicides. Fungicides currently in use in

North America include benomyl (Benlate), chlorothalonil (Bravo 500), captan, dichloran, iprodione and vinclozolin (James and Gilligan 1983). The effectiveness of chemical control can be reduced by the development of fungicide tolerant strains of B. cinerea.

Tolerance to fungicides is thought to develop from within a resident population when the sensitive strains of B. cinerea are killed with a fungicide, leaving the tolerant strain to develop without competition. The exclusive use of one or two fungicides over an extended period of time promotes the tolerant strains (James and Gilligan 1983).

Several studies conducted in the United States have shown that tolerance of B. cinerea to several fungicides exists. In a study done by Gillman and James 1978, tolerance was found to benomyl, zineb, mancozeb and chlorothalonil in three Colorado nurseries. No tolerance was found for dichloran and little tolerance for captan. Benomyl had not been used previously in one study nursery where a benomyl tolerant strain of B. cinerea was found.

Cooley, in a 1981 study, found tolerance to several fungicides in B. cinerea isolates from different tree species and nurseries in the U.S. pacific northwest. Tolerant strains of B. cinerea were found for benomyl, mancozeb, captan, chlorothalonil and vinclozolin. Little or no tolerance was found for dichloran.

A 1983 study conducted in Montana by James and Gilligan tested ten isolates of B. cinerea and six fungicides. Tolerance to benomyl, chlorothalonil and captan was reported. No tolerance was found for iprodione or dichloran and only slight tolerance for vinclozolin.

In British Columbia, current guidelines recommend that prior to canopy closure a protectant spray of Benlate and Bravo 500 be used. Bravo 500 may also be used alone on any infected seedlings. Prior to storage, seedlings are sprayed with a combination of Captan and Benlate (B.C. Nursery Production Guide 1984).

Reviewing the annual summaries of the Reforestation Disease Extension Reports of the Canadian Forestry Service gives an indication of the history of B. cinerea in British Columbia and the effectiveness of control efforts. From 1976 to 1980, no serious problems were encountered, with any outbreaks of B. cinerea being controlled by fungicidal sprays. Beginning in 1981, problems were encountered in controlling the disease in several nurseries (Lock 1983-1976). Tests conducted in 1980 using Benlate indicated that some tolerant strains were present.

Concern over these control problems led to this study being conducted to assess the tolerance of B. cinerea populations in nurseries throughout British Columbia to the fungicides Benlate, Bravo 500 and Captan. Tolerant strains were identified so that future control measures could be modified to the type of strain present in a certain locality. The presence of widespread tolerance to the chemicals currently used for control of B. cinerea would emphasize the need for new chemical controls.

MATERIALS AND METHODS:

A survey of *B. cinerea* populations at nurseries in British Columbia was conducted to assess tolerance to the currently used fungicides Benlate, Bravo 500 and Captan (see Table 1). The concentrations of fungicides used in this study are the recommended rates from the 1984 B.C. Nursery Production Guide.

Samples of *B. cinerea* infections were collected by nursery staff at container nurseries throughout the province. Both B.C. Ministry of Forests (BCMOF) and some private nurseries were surveyed. From an infection spot, up to five damaged seedlings were collected, clipped at root collar level, and the shoots placed in a plastic bag, to create one sample. The samples from each nursery were sent to the Pacific Forest Research Centre (PFRC) in Victoria. A total of 370 active samples were evaluated from 17 nurseries. Additional samples were received, but failed to produce *B. cinerea* conidiospores during incubation.

At PFRC, samples were processed according to a priority list set by the BCMOF. Any samples that had to be stored were kept in cold storage at 1 C and processed as soon as possible. Each sample was examined and infected portions were clipped from each shoot. These pieces were washed under running water and then placed in an incubation box with moistened filter paper (see Fig.1). Plastic wrap was secured on the top of the box with an elastic band. These samples were then set on a window ledge to incubate for a period of three to seven days.

During this incubation, treatment plates were prepared. There were four treatments, including the potato dextrose agar (PDA) check (see

Table 2). The fungicides were added to autoclaved PDA solution, cooled to 50 C. All fungicides were added directly to the PDA solution, agitated and then poured. This method of assessing tolerance of *B. cinerea* to fungicides was adapted from a procedure developed by Dr. John Hopkins (Hopkins 1984). The amounts of fungicides added are shown in Table 2. These rates were chosen from the 1984 B.C. Nursery Production Guide as the recommended rates of these fungicides for control of *B. cinerea* in container stock.

After incubation, the samples were checked using a stereo microscope for fresh conidia and sporulation (see Fig.2). Spores from a sample were transfered to petri dishes containing PDA and amended PDA. This transfer was done using a flamed sterile inoculating loop and sterile distilled water. Whenever possible, each replicate on the different treatments was taken from the same area of a sample. There were four replicates for each treatment.

After inoculation, the plates were stored in plastic bags at room temperature. Intial assessment was made after three days, with a second assessment seven days after inoculation. Assessment of each replicate was based on whether there was any evidence of *B. cinerea* growth (see Fig. 3). No distinction was made regarding size of growth. A sample was deemed tolerant if at least two of the four replicates showed growth at three days or if one showed growth at three days and two or more seven days after inoculation. Bacterial growth often contaminated the plates (see Fig. 4).

Pesticide spray records for the 1984 growing season were obtained from the nurseries surveyed. These were evaluated and an attempt was made to find any correlation between the occurrence of tolerant strains of *B. cinerea* and the use of fungicides.

TABLE 1. FUNGICIDES USED IN TRIAL

TRADE NAME	MANUFACTURER	PCP REG.NO.	REGIS-TRATION	LABEL RATE	BC NURSERY RATE
Benomyl 50 WP	Later Chem-icals Ltd.	11542	yes ornamentals	.5 g/l	1.02 g/l
Bravo 500	Diamond Shamrock Canada Ltd.	15723	yes general Botrytis	4.8 l/ha	3.2 l/ha
Captan 50 WP	Later Chem-icals Ltd.	5371	no	--	2.2 kg/ha

TABLE 2. FUNGICIDE AMENDED PDA

FUNGICIDE	AMOUNT ADDED	A.I. ADDED	PPM A.I.
Benlate	1.0 g/l PDA	0.500 g/l PDA	500 ppm
Bravo 500	3.0 ml/l PDA	1.2 ml/l PDA	1200 ppm
Captan	2.0 g/l PDA	1.0 g/l PDA	1000 ppm

FIGURE 1. SAMPLE IN INCUBATION BOX

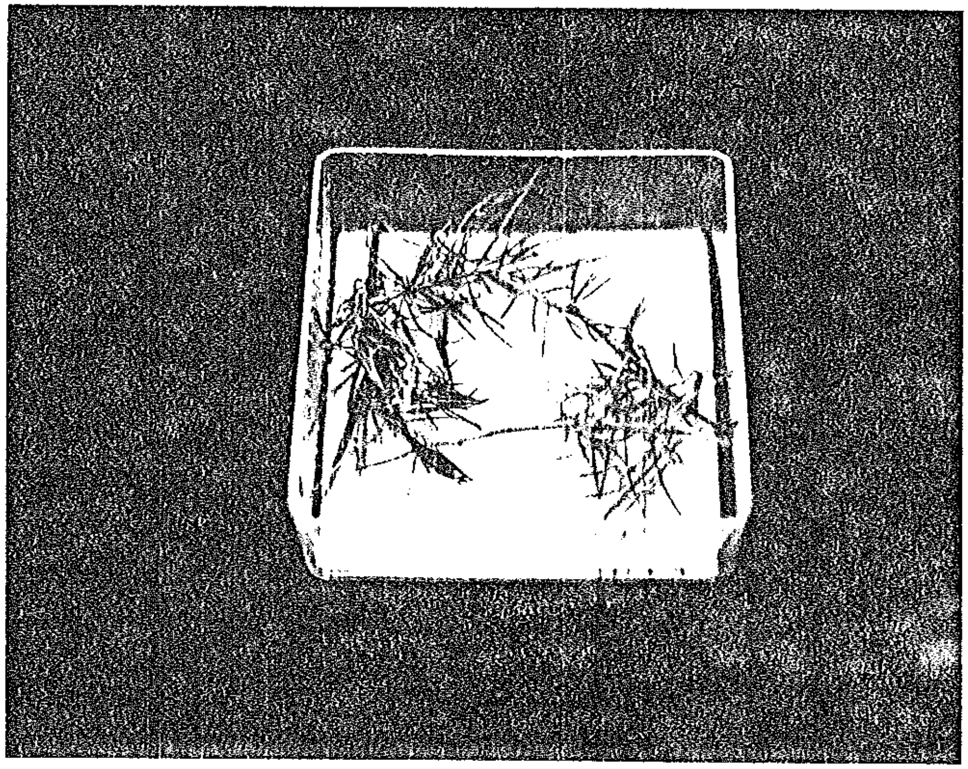


FIGURE 2. FRESH CONIDIA ON INCUBATED SAMPLE

FIGURE 3. GROWTH OF TOLERANT STRAINS OF <u>B. CINEREA</u>

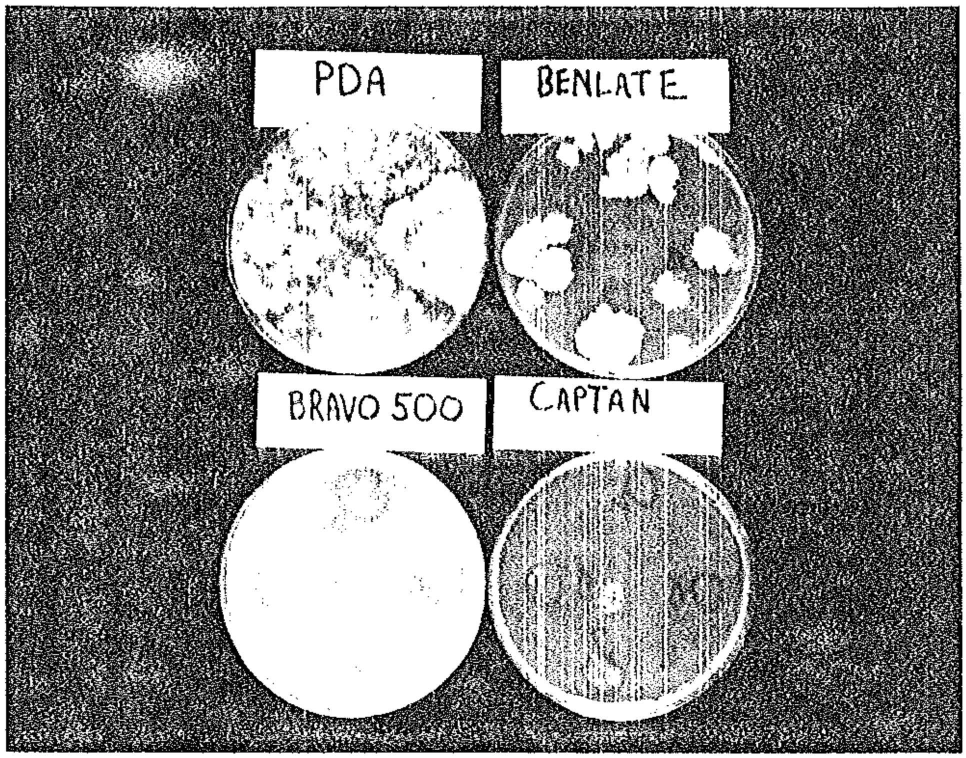
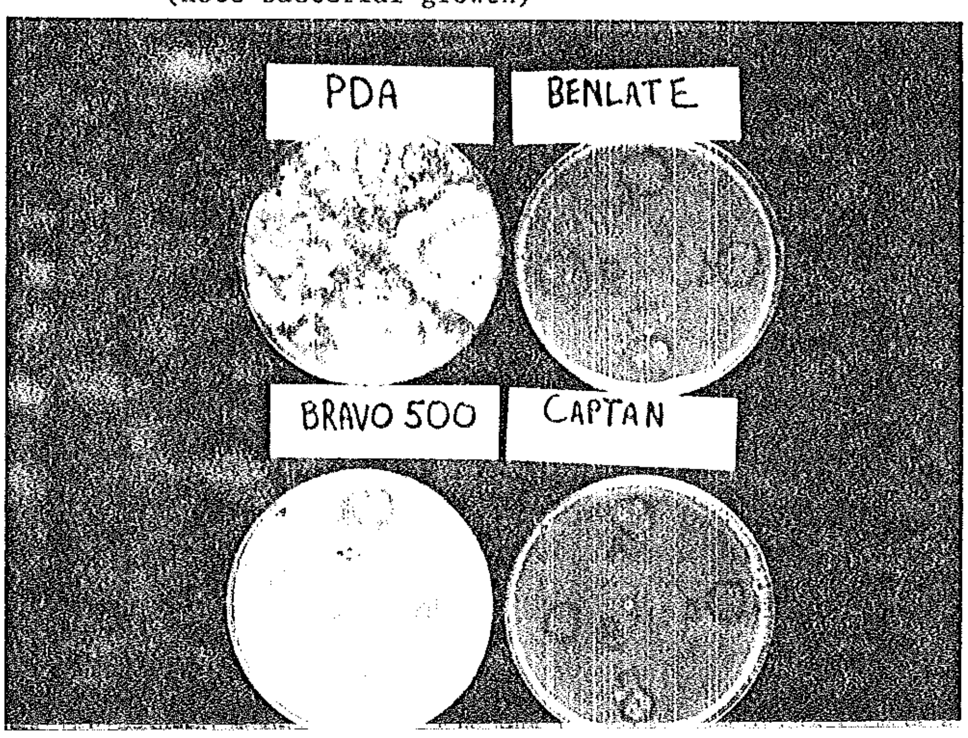


FIGURE 4. SENSITIVE STRAINS OF <u>B. CINEREA</u>
(note bacterial growth)



RESULTS:

Table 3 gives the results of this survey of B.C. nurseries for tolerance of *B. cinerea* to the fungicides Benlate, Bravo 500 and Captan. No tolerance to Captan was found in any of the tested isolates. Variable tolerance was found throughout the province to the other two fungicides. Isolates from four nurseries, Campbell River Provincial Nursery, Green Timbers Provincial Nursery, MacMillan Bloedel Nursery and Sylvan Vale Nursery showed high (above 67%) tolerance to both Benlate and Bravo 500. Low (below 33%) tolerance to Benlate and Bravo 500 was found only in isolates from Reid Collins Nursery and Puckle Road Test Nursery.

Isolates from Koksilah Provincial Nursery and Crown Forest Products Nursery showed a low level of tolerance to Benlate and a medium (34%-66%) tolerance to Bravo 500. Conversely, Vernon Provincial Nursery and Balco Industries Nursery isolates showed a medium tolerance to Benlate and a low tolerance to Bravo 500. Results by greenhouse for each nursery surveyed are found in Appendix 1.

As shown in Table 4, 74% of the 370 samples evaluated showed tolerance to Benlate; 60% were tolerant to Bravo 500 and no tolerance to Captan was found. Disregarding species with less than ten samples, isolates of *B. cinerea* from mixed spruce (*Picea* sp.) was the most tolerant to Benlate and the least tolerant to Bravo 500. Both interior and coastal Douglas-fir isolates showed a high level of tolerance to Benlate. The tolerance to Bravo 500 was lower in the isolates from interior Douglas-fir than in the coastal Douglas-fir isolates.

Isolates from western red cedar (*Thuja plicata* Donn) showed the highest tolerance to Bravo 500 and a high tolerance to Benlate. Although the sample numbers limit the interpretation, lodgepole pine (*Pinus contorta* Dougl.) isolates showed tolerance to Benlate but none to Bravo 500. *B. cinerea* isolates from western larch (*Larix occidentalis* Nutt.) showed tolerance to both Benlate and Bravo 500. Results by tree species for each nursery surveyed are found in Appendix 2.

Evaluating the pesticide spray records of the nurseries surveyed proved inconclusive. Of the three nurseries with a high tolerance to both Benlate and Bravo 500, spray records indicate that only Sylvan Vale Nursery applied these fungicides more frequently than recommended. Spray records from nurseries with a medium tolerance to Benlate indicate that only one, Harrop Nursery, applied Benlate more often in some greenhouses than recommended. All other nurseries in this tolerance class followed recommendations for Benlate use. Of the nurseries showing a medium tolerance to Bravo 500, Harrop and Koksilah Nurseries indicate a high number of Bravo 500 applications. Spray records from nurseries with a low tolerance to Benlate or Bravo 500 indicate that the recommendations were followed for the respective fungicides.

TABLE 3. FUNGICIDAL TOLERANCE OF *BOTRYTIS CINEREA* IN B.C. NURSERIES

TOLERANCE	BENLATE	BRAVO 500	CAPTAN
LOW 0%-33%	Koksilah(46) Reid Collins(39) Crown Forest(17) Puckle Rd.(6)	Vernon(7) Red Rock(3) Reid Collins(39) Puckle Rd.(6) Balco(21)	all samples 0% tolerance to Captan
MEDIUM 34%-66%	Vernon(7) Surrey(38) Red Rock(3) Balco(21) Pacific Forest(4) Hybrid(2) Harrop(24)	Koksilah(46) Green Timbers(38) Harrop(24) Crown Forest(17)	
HIGH 67%-100%	Campbell River(96) Green Timbers(38) Mac. Blo.(16) Sylvan Vale(12)	Campbell River(96) Surrey(38) Mac. Blo.(16) Sylvan Vale(12) Pacific Forest(4) Hybrid(2)	

(the number following the nursery name is the number of samples used to determine tolerance.)

TABLE 4. FUNGICIDAL TOLERANCE OF *BOTRYTIS CINEREA* ON TEN TREE SPECIES

SPECIES	BENLATE	BRAVO 500	CAPTAN
Douglas-fir coastal	114 / 156 = 73%	120 / 156 = 77%	all samples showed 0% tolerance
Douglas-fir interior	14 / 18 = 78%	7 / 18 = 39%	
Spruce(mixed)	70 / 79 = 89%	14 / 79 = 18%	
Western red cedar	37 / 53 = 70%	45 / 53 = 85%	
Yellow cedar	0 / 1 = 0%	1 / 1 = 100%	
Western hemlock	23 / 44 = 52%	31 / 44 = 70%	
Mountain hemlock	1 / 1 = 100%	0 / 1 = 0%	
Lodgepole pine	6 / 9 = 67%	0 / 9 = 0%	
Western larch	5 / 7 = 71%	3 / 7 = 43%	
Noble fir	2 / 2 = 100%	1 / 2 = 50%	
TOTAL	272 / 370 = 74%	222 / 370 = 60%	

DISCUSSION:

Tolerance of B. cinerea to Benlate or Bravo 500 appears to be a significant problem in B.C. container nurseries. Although no tolerance was found for Captan in this survey, tolerance has been reported in other studies (Gillman and James 1978, Cooley 1981, James and Gilligan 1983). Some growth of B. cinerea was noted on Captan ammended PDA in this study. The growth occured ten days after incubation. Transfers of both spores and mycelia indicated that the growth rate changed with time after inoculation. This could be caused by the adaption of the fungus or by breakdown of the fungicide with time.

A total of seven nurseries showed a high level of tolerance to Benlate or Bravo 500. Tolerance to both fungicides was found in many nurseries. Isolates from Douglas-fir, western red cedar and western hemlock were found to be the most tolerant to Benlate and Bravo 500. Isolates from spruce were tolerant to Benlate, but not to Bravo 500.

The attempt to find a correlation between occurence of tolerance and fungicide use was inconclusive for several reasons. The spray records obtained from the nurseries were often difficult to interpret, that is, exactly how much of each fungicide was sprayed in each greenhouse. Also, the 1984 Nursery Production Guide is vague as to the number of times Bravo 500 is to be used. Bravo 500 is also used to control Siroccocus blight.

The high level of tolerance to Benlate and Bravo 500 found in B.C. indicates that the populations of B. cinerea throughout the province are becoming tolerant to the fungicides used to control them. Numerous other fungicides (e.g. dichloran, iprodione) used in the United States for control of *B. cinerea* on conifer seedlings are registered for use on agricultural crops in Canada. Using a wider variety of fungicides in rotation would allow better control of *B. cinerea* and help in preventing the build up of tolerant strains (Gillman and James 1978, James and Gilligan 1983).

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APPENDIX I
BOTRYTIS CINEREA TOLERANCE BY GREENHOUSE

CAMPBELL RIVER NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
ODC	97%	80%	0%	35
SH 1	91%	78%	0%	23
SH 2	100%	100%	0%	6
SH 3	100%	83%	0%	6
SH 4	100%	100%	0%	7
SH 5	80%	80%	0%	5
SH 7	100%	0%	0%	1
GH 1	100%	88%	0%	8
GH 3	80%	80%	0%	5
TOTAL	95%	80%	0%	96

VERNON NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
---	57%	29%	0%	7

KOKSILAH NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
SH 3	33%	66%	0%	3
SH 4	0%	100%	0%	1
SH 6	0%	100%	0%	3
SH 7	20%	40%	0%	5
SH 8	50%	33%	0%	6
GH 1	100%	33%	0%	3
GH 2	0%	100%	0%	3
GH 4	100%	0%	0%	1
GH 5	100%	0%	0%	1
GH 8	0%	50%	0%	2
GH 15	25%	100%	0%	4
GH 16	17%	50%	0%	6
GH 17	0%	17%	0%	6
TOTAL	26%	50%	0%	46

GREEN TIMBERS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
LC	100%	0%	0%	5
GH 6	60%	33%	0%	15
GH 7	100%	92%	0%	12
GH 8	75%	75%	0%	4
GH 9	100%	100%	0%	1
GH 11	100%	0%	0%	1
TOTAL	74%	53%	0%	38

SURREY NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
SH	0%	100%	0%	1
SH 1	50%	100%	0%	2
SH 2	50%	88%	0%	24
SH 4	66%	100%	0%	3
SH 8	100%	100%	0%	1
SH 9	0%	0%	0%	1
SH 1,2,4	40%	100%	0%	5
GH 8	100%	100%	0%	1
TOTAL	50%	89%	0%	38

HARROP NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 2	83%	33%	0%	12
GH 3	0%	100%	0%	1
GH 5	0%	0%	0%	1
--	50%	100%	0%	10
TOTAL	63%	63%	0%	24

RED ROCK NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 2	50%	0%	0%	2
GH 5	100%	0%	0%	1
TOTAL	66%	0%	0%	3

REID COLLINS NURSERY _BOTRYTIS CINEREA_ TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
H 1	66%	33%	0%	3
LH 7N	100%	100%	0%	1
LH 7S	100%	100%	0%	1
GH 1	33%	0%	0%	3
GH 2	44%	22%	0%	9
GH 3	0%	0%	0%	2
GH 4	100%	0%	0%	1
GH 5	0%	0%	0%	2
GH 6	0%	0%	0%	1
GH 7	0%	0%	0%	1
GH 8	0%	0%	0%	1
GH 9	0%	0%	0%	1
GH 10	50%	0%	0%	2
GH 11	0%	0%	0%	1
GH 12	0%	0%	0%	1
GH 13	0%	0%	0%	3
GH 14	0%	0%	0%	1
GH 15	0%	0%	0%	1
GH 16	100%	0%	0%	1
GH 17	0%	0%	0%	1
GH 18	0%	0%	0%	1
GH 19	0%	0%	0%	1
TOTAL	31%	13%	0%	39

BALCO NURSERY _BOTRYTIS CINEREA_ TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 1	57%	14%	0%	14
GH 2	57%	29%	0%	7
TOTAL	57%	19%	0%	21

MACMILLAN BLOEDEL NURSERY _BOTRYTIS CINEREA_ TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 1	100%	60%	0%	5
GH 2	100%	100%	0%	6
GH 3	100%	100%	0%	4
GH 4	100%	100%	0%	1
TOTAL	100%	81%	0%	16

PACIFIC FOREST PRODUCTS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 1	50%	75%	0%	4
TOTAL	50%	75%	0%	4

SYLVAN VALE NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO.OF SAMPLES
GH 2	100%	100%	0%	1
GH 5	100%	100%	0%	3
GH 7	100%	100%	0%	1
GH 8	100%	50%	0%	2
GH 9	100%	100%	0%	2
GH 12	100%	100%	0%	1
GH 17	100%	100%	0%	2
TOTAL	100%	86%	0%	12

CROWN FOREST PRODUCTS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
GH 1	13%	50%	0%	8
GH 2	0%	75%	0%	8
TOTAL	6%	63%	0%	16

HYBRID NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
TOTAL	50%	100%	0%	2

PUCKLE ROAD TEST NURSERY *BOTRYTIS CINEREA* TOLERANCE BY GREENHOUSE

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
GH 1	0%	0%	0%	3
GH 2	0%	33%	0%	3
TOTAL	0%	17%	0%	6

APPENDIX II
BOTRYTIS CINEREA TOLERANCE BY TREE SPECIES

CAMPBELL RIVER NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	93%	75%	0%	70
WRC	100%	96%	0%	26

VERNON NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
PL	0%	0%	0%	1
WL	71%	43%	0%	7

KOKSILAH NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
WH	24%	56%	0%	25
Si	25%	25%	0%	4
WRC	27%	53%	0%	15
PL	0%	0%	0%	2

GREEN TIMBERS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
PL	100%	0%	0%	5
S	63%	38%	0%	16
WH	75%	75%	0%	4
MH	100%	0%	0%	1
Dfc	100%	92%	0%	12

SURREY NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	49%	91%	0%	35
WH	100%	100%	0%	2
S	0%	0%	0%	1

HARROP NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfi	77%	38%	0%	13
S	0%	0%	0%	1
WRC	50%	100%	0%	10

RED ROCK NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
S	66%	0%	0%	3

REID COLLINS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	50%	17%	0%	6
Si	26%	6%	0%	31
WRC	100%	100%	0%	2

BALCO NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfi	80%	40%	0%	5
S	50%	13%	0%	16

MACMILLAN BLOEDEL NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	100%	86%	0%	14
WH	100%	100%	0%	2

PACIFIC FOREST PRODUCTS NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
WH	0%	100%	0%	1
CY	0%	100%	0%	1
Bn	100%	50%	0%	2

SYLVAN VALE NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	100%	100%	0%	2
WH	100%	90%	0%	10

PUCKLE ROAD TEST NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
Dfc	0%	0%	0%	1
S	0%	20%	0%	5

HYBRID NURSERY *BOTRYTIS CINEREA* TOLERANCE BY TREE SPECIES

	BENLATE	BRAVO 500	CAPTAN	NO. OF SAMPLES
S	50%	100%	0%	2