CURRENT STATUS OF DISEASE CONTROL IN FOREST TREE NURSERIES

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In the past two years a number of research studies have been published dealing with control of nursery diseases. However, in most cases this has not yet resulted in changes in pesticide registration. At this time, I would like to discuss some of the information with you to keep you up-to-date on several of the more recent tests.

Fusiform Rust - Most of you have been spraying with Ferbam to control fusiform rust since you got into the nursery business. It looks like you will continue to use it in the near future, at least. Because of the frequent number of applications required, especially in rainy weather, control has not always been what we would like. Losses of 30-50 percent of slash and loblolly pine seedlings still occur in some nurseries during years when weather is favorable for the rust.

The use of an effective long lasting systemic fungicide would go a long way in reducing losses to rust without requiring frequent application.

Rowan (3) tested the systemic fungicides Oxycarboxin, Carboxin, and Benomyl for rust control. These fungicides were applied weekly and biweekly with and without DMSO at 1000 and 2000 PPM. None of these fungicides were better than Ferbam applied at schedules now being used in the nurseries.

Hare (1), on the other hand, did get rust control with Benomyl and Oxycarboxin when it was incorporated into the soil. However, this study was done with potted plants that were inoculated and placed in greenhouses. He also found that the growth of galls could be stopped when the fungicides were applied to infected seedlings.

The application of these results to the nursery has yet to be tried to determine how effective it would be under field growing conditions.

Phomopsis Blight - Current restrictions prevent the use of mercury fungicides such as Merbam[R] and Puratized Agricultural Spray for control of Phomopsis Blight on red cedar and Arizona cypress. Peterson (2) listed 12 mercury fungicides which are effective but cannot be used. He also listed 25 fungicides that have been tested and found ineffective in controlling Phomopsis Blight.

Smyly and Filer (4) tested Benomyl, Kocide[R] 101 and Difolatan[R] for Phomopsis Blight control on Arizona cypress in Mississippi. Seedlings were sprayed at 7-10 day intervals from June 3 - November 4. PAS and unsprayed plots were included as a check. Benomyl gave good control

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3/ The Symbol [R] signifies trademark registration of the material's name and has no connection with its registration by the U.S.D.A.

compared to the other treatments including the PAS, Infection in the check plot was 73 percent and 49 percent in the PAS plot. Only 19 percent of the Benomyl treated seedlings wee infested while more than 50 percent of the Kocide® 101 and Difolatan treated seedlings were infected. Furthermore, infected seedlings in the Benomyl treatment were lightly infested and could have been outplanted with minor pruning of diseased branches.

Root Rots – The best control for root rots is still through soil fumigation. The fumigants should be applied when the temperature is 50-80° F and when soil moisture is adequate for good seed germination. The amount of fumigant used, the type of soil and the severity and type of root rot.

Methyl Bromide-Chloropicrin – Several Methyl Bromide or Methyl Bromide-Chloropicrin formulations are available, including Brozone®, MC-33, and MC-2. Listed below are the percentages of active ingredients for each formulation.

Fumigant	Methyl Bromide	Chloropicrin	Inert
Brozone®	68.6%	1.4%	30.0%
MC-33	67.0%	33.0%	0.0%
MC-2	98.0%	2.0%	0.0%

All of these formulations can control root rot diseases. However, on heavy soils and with hard to control diseases such as Cylindocladium root rot, formulations with a higher percentage of Chloropicrin have been giving better control. In some cases fumigation with Brozone® has resulted in an increase in the amount of root rot. The natural soil fungi which help keep Cylindrocladium in check are killed during fumigation, while the more resistant Cylindrocladium is not. Cylindrocladium then develops in an environment essentially free of soil competitors and the disease is worse than it was before fumigation. On the other hand, MC-33 at 350 lb/acre has reduced the amount of Cylindrocladium infection on Black walnut in nurseries where it has been used.

Containerized Seedlings – Root rot and damping-off of container grown pine seedlings is a major problem in growing seedlings in greenhouse environments.

Fusarium, Pythium, and Rhizoctonia have been found killing container grown pine seedlings. Fusarium is most frequently associated with diseased seedlings. One source of contamination has been from Fusarium naturally present on the seed coats of the pine seed.

New Registrations – The past two years have seen some new fungicide registrations. Chlorothalonil (Bravo® W-75 and Bravo® 6F) is now registered for Lophodermium and brown spot needle blights. This fungicide offers good alternative to Bordeaux mixture which can be corrosive to spray equipment.

Benomyl has been registered for powdery mildew, Anthracnose, root rots, Phomopsis Blight, and leaf spots. Busan® -72 was registered for seedling blight of pine in plastic bullet containers.

Registered Fungicides and Nematocides:

The status of registered pesticides is constantly changing, especially since the passage of the Federal Environmental Pesticide Control Act of 1972.

The following list gives the current (as of July, 1974), status of fungicides and nematocides registered to control diseases and nematodes commonly found in southern forest tree nurseries.

Since federal registrations are constantly changing and some states also have pesticide restrictions, check your State and local regulations for up-to-date information. Our Pesticide Specialist Atlanta, Georgia is also available for further pesticide information.1/

DISEASE	FUNGICIDE/NEMATOCIDE	HOST REGISTERED ON
1. Powdery Mildew	a) Benomyl (Benlate^{R})	Ornamentals
	b) Lime Sulfur	Deciduous Trees
	c) Copper Oleate	Shade Trees
	d) Copper-Zinc-Chromate Complex	Oaks & Ornamental Seed Beds
	e) Dinocap (Karathane^{R})	Trees
	f) Sulfur	Cedars, Dogwood, Sycamore, Willow, Juniper, Linden, Poplars & Spruce.
2. Anthracnose	a) Benomyl (Benlate^{R})	Ornamentals
	b) Lime Sulfur	Deciduous Trees
	c) Bordeaux Mixture	Dogwood, Sycamore, Oaks
	d) Copper, Oxychloride Sulfate (COCS)	White Oaks
	e) Copper Sulfate, Basic	Dogwood
	f) Copper Salts of Fatty & Rosin Acids	Sycamore
	g) Dodine (Cyprex^{R})	Sycamore, Black Walnut
	h) Maneb	Dogwood
	i) Zinc Iron-Maneb Complex (Manzate^{R}200)	Dogwood
	j) Zineb	Oaks, Sycamore
3. Damping-Off	a) Captan	Trees - Planting Beds
	b) Copper-Zinc-Chromate Complex	Ornamental Seed Beds (Postemergence-Damping-Off)
	c) Diazoben (Dexon^{R})	Trees
	d) Thiophanate	Nursery Crops
	e) ETCMTD (Terrazole^{R}, Koban^{R}, Truban^{R})	Container Southern Pine

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	f) Hexachlorophene (Nabac^{R}, Isobac^{R})	Ornamentals
	g) 8-Quinolinol Benzoate	Ornamental Seedlings
	h) 8-Quinolinol Sulfate	Ornamental Seedlings
	i) Thiram (Arasan^{R})	Seed Treatment - Conifer Seed
	-Soil Fumigants	
	j) Chloropicrin	Nursery Beds
	k) Methyl Bromide	" "
	l) Methyl Bromide & Chloropicrin	" "
	m) Methyl Isothiocyanate (Vorlex^{R})	" "
	n) DMTT (Mylone^{R})	" "
4. Root Rots		
	a) Captan	Tree Planting Beds
	b) Diazoben (Dexon^{R})	Trees
(Cylindrocladium & Thielaviopsis Rots)	c) Benomyl (Benlate^{R})	Conifers
(Dermatophora Root Rot)	d) Bordeaux Mixture	Oaks
(Fungus Rots)	e) Thiram	Tree Cuttings
	-Soil Fumigants	
	f) Methyl Bromide	Nurseries
	g) Methyl Isothiocyanate (Vorlex^{R})	"
	h) SMDC (Vapam^{R})	"
	i) DMTT (Mylone^{R})	"
5. Needle Blights and Needle Casts		
	a) Bordeaux Mixture	Pine & Spruce
(Twig Blight)	b) Bordeaux Mixture	Yew
(Brown Spot Needle Blight) (Lophodermium Needle Cast) (Brown Spot Needle Blight)	c) Copper Sulfate, Basic	Pines
	d) Chlorothalonil (Bravo^{R}, Daconil^{R})	Conifers
(Needle Cast & Brown Spot)	e) Maneb	Conifers
(Lophodermium Needle Cast)	f) Maneb Complex+Zinc (manzate^{R}200, Dithane^{R}M-45)	Conifer Nursery Planting

(Phomopsis Blight)	g) Benomyl (Benlate®)	Ornamentals
(Rhizoctonia Needle Blight)	h) PCNB (Terraclor®)	Southern Pine Seedlings
(Seedling Blight)	i) Busan®72	Pine Seeds in Plastic Bullets
(Seedling Blight)	j) Thiram (Arasan®)	Conifer Seed

6. Leaf Spots & Blotchs

	a) Lime Sulfur	Deciduous Trees
	b) Bordeaux Mixture	Dogwood, Elm, Linden, Maples, Sycamore, Oaks, Palms
	c) Copper Sulfate, Basic	Dogwood, Maples, Oaks
	d) Zineb	Dogwood, Hickory

7. Rusts

(Cedar-Apple Rust)	a) Bordeaux Mixture	Cedar
(Cedar-Apple Rust)	b) Cycloheximide (Acti-dione®)	Cedar
(Cedar-Rust)	c) Ferbam (Fermate®, Carbamate®)	Juniper
(Cedar-Apple Rust)	d) Zineb	Juniper, Red Cedar
(Fusiform Rust)	e) Ferbam (Fermate®, Carbamate®)	Pine Seedlings
(Fusiform Rust)	f) Ziram	Pine Seedlings (Nursery Beds)
(Blister Rust Canker)	g) Cycloheximide (Acti-dione®)	White Pine

8. Seed Decay Rots	a) Captan	Tree Planting Beds
	b) Busan®72	Pine Seed in Plastic Bullets
	c) Thiram (Arasan®)	Conifer Seed

9. Bacterial Wilts	a) Chloropicrin	Nursery Beds
	b) Methyl Bromide	" "
	c) Methyl Isothiocyanate (Vorlex®)	" "
	d) SMDC (Vapam®)	" "

10. Namatodes	a) Thionazin (Zinophos^{R})	Pre- and post-Plant Treatments on most conifer & Deciduous Trees
(Root Rot Nematodes)		
	b) Carbon Disulfide	Soil Treatment
	c) D-D Mixtures	Forest Tree Planting & Nursery Sites
	d) DBCP (Nemagon^{R}, Fumaxone^{R})	Pre- and Post-Plant Treatments on most Conifer & Deciduous Trees
	e) Dichloropropene (Trelone^{R})	Forest Tree Planting & Nursery Sites
	f) Ethylene Dibromide	Nursery Seed Beds
	g) Methyl Bromide	Soil Treatment
	h) Methyl Bromide & Chloropicrin	Soil Treatment
	i) Methyl Isothiocyanate (Vorlex^{R})	Field & Green House Soils
	j) SMDC (Vapam^{R})	Tree Planting & Seed Bed Sites
	k) DMTT (Mylone^{R})	Forest Tree Seed Beds

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