

# Treating Mistletoe (*Phoradendron serotinum*) In Trees

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May 2003

Mistletoe (*Phoradendron serotinum*) is a scourge of old and stressed trees, stealing away great volumes of water and nitrogen. Understanding the American mistletoe's life cycle and its unique biological features can help prepare an appropriate response and intervention program. Left alone to reproduce and prosper, mistletoe will initiate a decline and death spiral in slower growing trees difficult to reverse. Note any specific commercial product mentioned here does not represent an endorsement nor a statement of effectiveness, but a summary of marketplace information at the time this publication was prepared.

## Primary Treatment

Early intervention is critical when dealing with mistletoe infections. The single clump or small stem visible in January on a deciduous tree may look insignificant. Any appearance of a mistletoe infection is important to note. Whenever cleaning, thinning, or reducing a tree crown, mistletoe needs to be targeted. In hazard assessment potential, branch structural losses should be assessed and mistletoe removal considered. Do not leave mistletoe in trees! Use clump density assessments to prioritize trees for mistletoe removal work, remembering apathy and procrastination lead to inoperative massive infections and increased structural failure risks for the tree.

The appropriate response in treating mistletoe infections revolves around the current number and size of infection points, the sex of the clumps, the expected infection rate, and tree health status and species. Table 1 provides a simple rating guide for appropriate response. A worksheet is available entitled *Simple Numerical Rating Guide for Gauging Mistletoe Infection Levels in Trees*. Remember, early intervention is critical to contain infection centers.

## Interventions

There are currently three interventions for mistletoe infections, each delivering varying results. The three interventions are shoot pruning of the mistletoe, pruning the infected tree branch, and/or using a labeled chemical spray (ethephon).

**Mistletoe Shoot Removal** ñ One traditional treatment for mistletoe infection is to knock off the brittle stems from tree branches. The mistletoe stems snap-off easy and nearly flush with the branch bark. This treatment immediately reduces water loss from the tree, and reduces mistletoe reproduction. Unfortunately, simply knocking off mistletoe stems do not eliminate the infection because the endophytic part of the mistletoe remains intact. It usually is several years before mistletoe shoots noticeably reappear after removal. Approximately 80% of all pruned mistletoe stems regrow. While without green shoots, the mistletoe is forced to become completely parasitic on the tree. Mistletoe shoot removal may be a viable treatment on main stem infections where pruning is not practical.



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Another associated traditional treatment is to knock off mistletoe stems and cover the infection site with heavy pruning paints, aluminum foil, tin disks, tarpaper, or black plastic. This treatment was thought to prevent mistletoe shoot formation and starve the haustoria embedded in the tree branch. This treatment has limited effectiveness when applied so as to not injure tree tissues around the infection site with a topical coating or an effective means of keeping any covering properly affixed. Generally, these types of mistletoe shoot stub treatment is not effective and so, not recommended.

**Tree Pruning** ñ Pruning is the most common means of controlling mistletoe. A twig or branch infected with mistletoe should be pruned at the nearest healthy originating node below an infection site. The target node for pruning should be at least 14 inches below the infection site. Mistletoe infection site elimination through branch pruning should be treated as a proper reduction cut. Do not tip, top, or use internode cuts on the twig or branch. Years will be needed for a tree to regain structural integrity after extensive mistletoe removal pruning.

**Chemical Spray** ñ Currently there is a chemical product labeled for mistletoe shoot control which contains a shoot abscission chemical called ethephon [(2-chloroethyl) phosphonic acid] which generates ethylene, a plant growth regulator. This product is sold under the name FLOREL brand growth regulator, a trademark of the Rhone-Poulenc AG Company, and distributed by Monterey Lawn & Garden Products, Fresno, CA. **(Information for this publication regarding this product came from the company's web site (accessed 4/1/2003). All label information was derived from the electronic version of the chemical product label.)**

The product as currently formulated contains 3.9% ethephon (0.33 lbs ethephon per gallon). Approximate pricing in the first quarter of 2003 was \$28.00 per quart. This product is labeled for the removal of leafy mistletoe shoots in ornamental deciduous trees. Note a wide variety of other concentrations and application methods have been used in past research papers.

This ethephon product should be sprayed directly on the mistletoe clumps until their foliage and stems are wet. Timing is crucial to prevent tree damage. Spraying should be completed before tree bud burst in Spring when daytime temperatures are above 65°F. **Mix the product following all label directions.** For example, under current label mixing instructions, mix one quart of product in 2 gallons of water for 5400ppm concentration. Use of a surfactant is recommended. Spray only when no rain is forecast for a minimum of 24 hours. Return to and respray large clumps of mistletoe in one week. Mix and spray this product immediately. Do not store the mixed spray liquid for more than a few hours. Care is needed to prevent over-spray from staining hardscapes or damaging painted surfaces. Re-treat every four years as needed.

**Remember to carefully read and review the product label for your personal safety, safety of other living things, and the legal context of product use.** Do not use this product near individuals or habitats of protected species, some of which could be around or on the tree exterior.

## **Other Treatments**

There have been a number of pesticide treatments used in the past including applications using trunk injections, infection site injections, foliage and stem stub paints, and directed sprays. For example, copper sulphate, 2,4D (2, 4-dichlorophenoxy acetic acid), 2,4D and dicamba, cycloheximide (citrus fruit abscission agent), glyphosphate (N-phosphonomethyl glycine), glyphosphate and triclopyr ester, and a variety of other contact herbicides have all been tried with either negative or highly variable results. **None of these treatments are labeled for mistletoe eradication** and are only listed here to demonstrate the breadth of treatment options which have been attempted. More exotic treatments include freezing, clear plastic bagging, black plastic bagging, soil active herbicides, synthetic amino acids, and applying growth regulation cocktails.

Most of the treatments attempted have had limited or no long-term effects. No effective biological control has been found. Trees resistant to mistletoe infection have been sought, but healthy, vigorous trees

under little water stress out-grow the infection just as well. Reduction of the bird dispersal vector is possible, but ecologically and socially unacceptable in most cases.

### Ecological Context

Our mistletoe is a unique and common plant. Other mistletoes around the world range in importance from nuisance to endangered. Eradication of this plant is important in established and managed landscapes, and the areas which surround managed lands, because of damage to old, large, socially significant or valuable trees which cannot be easily replaced. Complete elimination of mistletoe is not possible, but would represent an ecological hardship for a number of animal species which depend upon mistletoe for food, especially during the barren times of Winter and early Spring. One extreme example of an ecological hardship is to a butterfly. Mistletoe is the only host of the great blue hairstreak (*Atlides halesus*) butterfly. The larvae can be seen eating the leaves of mistletoe. In addition to food, mistletoe generates rare habitat through dead wood and cavities in trees, structural failures of large woody materials, and woody ground debris -- all of which serve as a resource for a variety of living things.

### Conclusions

Under moderate intensity landscape management, no chemical or biological control is recommended. Thinning of tree stem density, and crown thinning of branches and foliage to minimize transmission vectors can have limited impact. Continual crown cleaning, especially of female clumps, and occasional crown thinning is recommended to prevent build-up of mistletoe populations. Under intensive landscape management, a program of careful pruning and repeated chemical treatment is recommended.

A publication on general mistletoe growth, botanical features, tree hosts, tree damage and its poisonous nature is: **Mistletoe (*Phoradendron serotinum*) Infection In Trees**, (University of Georgia School of Forest Resources publication FOR03-7. 2003. Pp.4). A publication on how mistletoe infects trees is: **Tree Infection Process in American Mistletoe (*Phoradendron serotinum*)**, (University of Georgia School of Forest Resources publication FOR03-8. 2003. Pp.4). A publication which provides a list of important research papers and literature on American mistletoe is: **Selected Literature on Mistletoe Infection in Trees**, (University of Georgia School of Forest Resources publication FOR03-10. 2003. Pp.2).



Table 1: Numerical rating guide for gauging mistletoe infection levels in trees.

male infections	rating	female infections	rating
one single stem	0	none	0
1-3 sprigs emerging	0	single stem	0.5
		1-3 sprigs emerging	0.5
1-3 developing clumps	0.5	1-3 developing clumps	1
1-5 developed clumps	1	1-5 developed clumps	3
>5% crown area or volume	2	>5% crown area or volume	7
>10% crown area or volume	5	>10% crown area or volume	17
>25% crown area or volume	16	>25% crown area or volume	38
>50% crown area or volume	49	>50% crown area or volume	80

Corrections:	multiplier
high vigor, fast growing, healthy tree	X 1.0
medium vigor, susceptible species tree	X 1.3
low vigor, highly stressed tree	X 1.7
(take rating times the multiplier for final rating)	

Actions (mechanical / chemical):	rating
clump removals	over 1
crown cleaning and clump removal	over 4
tree restoration and clump removals	over 7
potential tree removal	over 18
tree removal	over 25

# Simple Numerical Rating Guide for Gauging Mistletoe Infection Levels in Trees

## ñ Worksheet ñ

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male infections	rating	check	female infections	rating	check
none	0	_____	none	0	_____
single stem	0	_____	single stem	0.5	_____
1-3 sprigs emerging	0	_____	1-3 sprigs emerging	0.5	_____
1-3 developing clumps	0.5	_____	1-3 developing clumps	1	_____
1-5 developed clumps	1	_____	1-5 developed clumps	3	_____
>5% crown area or volume	2	_____	>5% crown area or volume	7	_____
>10% crown area or volume	5	_____	>10% crown area or volume	17	_____
>25% crown area or volume	16	_____	>25% crown area or volume	38	_____
>50% crown area or volume	49	_____	>50% crown area or volume	80	_____

BASIC TREE RATING = \_\_\_\_\_

Corrections:	multiplier	check
high vigor, fast growing, healthy tree	X 1.0	_____
medium vigor, susceptible species tree	X 1.3	_____
low vigor, highly stressed tree	X 1.7	_____

(take basic tree rating times the multiplier for corrected tree rating)

CORRECTED TREE RATING = \_\_\_\_\_

Actions (mechanical / chemical):	corrected tree rating	check
clump removals	over 1	_____
crown cleaning and clump removal	over 4	_____
tree restoration and clump removals	over 7	_____
potential tree removal	over 18	_____
tree removal	over 25	_____

INTERVENTION ACTIVITY: \_\_\_\_\_

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