

INCIDENCE AND MANAGEMENT OF CANKER STAIN IN LONDON PLANE TREES IN MODESTO, CALIFORNIA

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Abstract. London Plane trees in Modesto, California, are seriously threatened by canker stain, a fungus disease that has destroyed many plane trees in the eastern and southern United States. Current efforts to prevent the spread of the disease in park and street trees include the experimental use of the fungicide thiabendazole. Chemical disinfection of tools is also used when pruning plane trees. In some cases, healthy trees bordering infected trees are removed to prevent disease spread by root grafts.

Résumé. Les érables de Norvège à Modesto, Californie, sont sérieusement menacés par les changres, une maladie fongique qui a détruit plusieurs érables de Norvège dans les états de l'est et du sud des Etats-Unis. Les efforts courants pour prévenir la propagation de la maladie sur les arbres de rues et dans les parcs incluent l'usage expérimental du fongicide "thiabendazole". La désinfection chimique des outils est aussi réalisée lors de l'élagage des érables de Norvège. Dans certains cas, les arbres sains situés à proximité d'arbres contaminés sont abattus afin de prévenir la propagation de la maladie par les greffes de racines.

Canker stain, a disease caused by the fungus *Ceratocystis fimbriata* f. *platani* has killed thousands of London plane trees (*Plantanus X acerifolia*) in northeastern United States since about 1926 (4). The disease has long been known to destroy plane trees in southern United States as well (3). More recently, canker stain was identified as a serious threat to American sycamores (*P. occidentalis*) in the Midsouth (6).

In California the disease appears to be confined to Modesto, a community in the San Joaquin Valley. Canker stain was detected by us in 1961 from 35-to 45-year-old London plane trees growing as city street plantings in Modesto. The fungus, *C. fimbriata*, was pathogenic to London plane and California sycamore, *P. racemosa*. Since then, the disease has spread to 28 areas in parks and along streets and has destroyed some 600 mature trees.

Both London plane and American sycamore are grown in Modesto, and both have been equally affected. There is no obvious resistance to the disease by American sycamore as has been suggested (7). Symptoms are typical for the disease: trees show sparse foliage and undersized leaves

(5); infected trees are often killed in a single summer; however, declining trees in Modesto do not develop trunk and limb cankers as often as do trees in the East (5).

Plane trees in Modesto street plantings are killed in rows as reported for other areas (4), suggesting that root grafts are involved in the spread of the disease. It has been shown that canker stain may spread from tree to tree through root grafts (1). Nitidulid beetles, which are common in the Modesto area, have also been implicated in the spread of the disease (7).

Canker stain also is spread mechanically, and City of Modesto tree crews thoroughly disinfect pruning tools with Lysol Aerosol Spray Disinfectant (contains o-phenyl phenol 0.10%, N-alkyl (C₁₈ 92%, C₁₆ 8%)-N-ethyl morpholinium ethylsulfates 0.03%, alcohol 67.75%, inert 32.2%) after use on each plane tree, regardless of whether the trees are diseased. Pruning and other maintenance of street and park trees is done almost entirely by city crews, limiting mechanical spread of the disease. Private tree crews under contract to prune trees beneath utility lines are also advised to disinfect pruning tools. However, trees in landscaped areas may be injured and possibly infected by lawnmowers and other tools used around the trees by homeowners or, more seriously, by professional gardeners who service a number of yards throughout the city. Also, construction crews repairing sidewalks, curbs and utilities near trees may cause injuries that result in infection.

Despite the City of Modesto's efforts in containing canker stain by means of sanitation and rapid removal of infected trees, the disease continues to spread at an alarming rate. Because of the serious threat to the entire plane tree population in Modesto, an overall management strategy is being considered. This strategy includes chemical and cultural control techniques.

Current Tests

We are currently evaluating the effectiveness of the fungicide Arbotect 20-S [2-(4-thiazoyl) benzimidazole hypophosphite 26.6%, equivalent to 20% thiabendazole], in preventing the spread of the disease. Arbotect 20-S is currently federally registered for use in controlling Dutch elm disease as well as anthracnose in sycamores. Thiabendazole is effective in preventing growth of *C. fimbriata* f. *plantani* (2).

Ten mature (45 year old) London plane trees have been injected with Arbotect 20-S and 10 are being used as untreated controls in a paired design. The trees were apparently noninfected at the time of the injection, but growing within 100 m of canker stain infected trees. Treatments consist of injecting trees with Arbotect 20-S at the rate of 80 fl. oz of a 1% thiabendazole solution per 5 inches of trunk diameter (6 ml/l mm trunk circumference).

One-quarter inch diameter injection holes are drilled into test tree trunks at 5 inch intervals around the trunk circumference. The holes are drilled 1 inch deep and placed approximately 24 inches above the ground. The fungicide is injected into trees at 70 p.s.i. using compressed air and a system which delivers the diluted chemical from a reservoir through rubber hoses and ¼ inch diameter threaded nozzles.

Test trees were injected August 30, 1984, and again on September 4, 1985. Additionally, 13 trees were injected in October 1986 for observational purposes. Our plans call for injecting additional trees in 1987.

In some cases, Arbotect 20-S injections are being tested in conjunction with the removal of apparently healthy trees which border diseased trees in an attempt to disrupt root grafts which may spread canker stain. Healthy trees are then isolated and chemically protected. As this technique adds significantly to the cost of the control program, it is considered only as a way of protecting very valuable stands of plane trees, such as in parks. A vigorous public awareness program is being used to educate homeowners in the necessity of removing the apparently healthy trees.

Discussion

The future use of Arbotect 20—S for controlling canker stain of sycamore will depend upon its proven efficacy and its EPA registration for that use.

Present costs for Arbotect 20-S injections are estimated at \$34.65 per tree, including labor and materials. If effective in the long run, this expense is justifiable when considering present landscape tree values. Mature plane trees growing in Modesto parks have an estimated value per tree of \$2,925. Plane trees growing as City of Modesto street trees are valued at \$1,828 per tree. These values are based on an average dbh of 21 inches.

In the future, a public awareness program may also be used to stress the importance of avoiding the wounding of plane trees, particularly in neighborhoods where the disease is prevalent. Private gardeners must also be made aware of the disease and encouraged to sanitize equipment when working on plane trees.

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