

**California Pest Rating Proposal for**  
***Cytospora chrysosperma* (Pers. : Fr.) Fr. 1818**  
**(syn. *Valsa sordida* Nitschke)**

**Cytospora canker of poplar**

**Current Pest Rating: Z**

**Proposed Pest Rating: C**

Kingdom-Fungi; Phylum- Ascomycota;

Subphylum- Pezizomycotina; Class- Sordariomycetes;

Order-Diaporthales; Family- Cytosporaceae

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**Comment Period: 8/10/2020 through 9/24/2020**

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**Initiating Event:**

On June 1, 2020, a Cal Fire forest pest manager submitted a sample of California incense-cedar (*Calocedrus decurrens*) collected in Shasta County. The trees were experiencing needle cast and decline. CDFA plant pathologist Albre Brown detected *Cytospora chrysosperma* (teleomorph *Valsa sordida*) via molecular analysis. This is a known canker-causing pathogen and has been detected in California on other hosts but not on *C. decurrens* and it has not been formally rated. The risk to California from *C. chrysosperma* is described herein and a permanent rating is proposed.

**History & Status:**

**Background:**

The anamorphic genus *Cytospora* includes fungal endophytes that can be isolated from the bark, xylem, and leaves of asymptomatic woody plants, saprophytes that colonize and degrade the wood of dead or dying trees, and destructive pathogens causing cankers and dieback in many families of woody plants. *Cryptospora* is the type species for the genus *Cytospora*, originally described by Persoon in 1794. The teleomorph is *Valsa sordida* and is encountered less frequently than the *Cytospora* form. All

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sexual states have since been synonymized under the name *Cytospora* via molecular phylogenetic analyses (Adams et al., 2006; Rossman et al., 2015).

The diseases caused by *Cytospora* spp. are most economically damaging on stone fruit, pome fruit, and nut crops but can also cause significant damage to forest and ornamental trees (Agrios, 2005; Lawrence et al., 2017). Trees can be injured or even killed by cankers forming on the trunk or in the main crotch. Cankers can also form on the limbs and on the smaller twigs and branches. Infected branches of fruit trees often break at the site of the canker under the weight of the crop or during storms. *Cytospora cryptosperma* is most aggressive on trees under environmental stress, such as those suffering from drought or damaged by frost.

*Hosts: Acer sp., Acer circinatum, Acer douglasii, Acer glabrum, Acer palmatum, Acer platanoides, Acer pseudoplatanus, Acer rubrum, Acer saccharum, Aesculus hippocastanum, Alnus tenuifolia, Amelanchier florida, Armeniaca vulgaris, Betula sp., Betula fontinalis, Betula papyrifera, Betula papyrifera var. occidentalis, Calocedrus decurrens, Camellia sp., Caryota urens, Castanea mollissima, Cornus stolonifera, Crataegus azarolus, Crataegus douglasii, Elaeagnus angustifolia, Eriobotrya japonica, Eucalyptus globulus, Eucalyptus grandis, Eucalyptus viminalis, Ficus carica, Fraxinus excelsior, Fraxinus sp., Juglans nigra, Juglans regia, Ligustrum latifolium, Malus sp., Malus pumila, Malus sylvestris, Morus alba, Olea sativa, Persica vulgaris, Physocarpus opulifolius, Picea abies, Pinus nigra, Platanus orientalis, Populus alba, Populus alba var. pyramidalis, Populus angulata, Populus angustifolia, Populus balsamifera, Populus bolleana, Populus candicans, Populus cathayana, Populus ciliata Populus davidiana, Populus deltoides, Populus deltoides var. missouriensis, Populus deltoides var. monilifera, Populus diversifolia, Populus euphratica, Populus euramericana, Populus fremontii, Populus fremontii var. wislizeni, Populus gelrica, Populus gracilis, Populus grandidentata, Populus grandis, Populus heterophylla, Populus italica, Populus koreana, Populus laurifolia, Populus maximowiczii, Populus marilandica, Populus nigra, Populus nigra var. italica, Populus nigra var. thevestina, Populus pekinensis, Populus pioner, Populus pruinosa, Populus russkii, Populus sargentii, Populus senknensis, Populus serotina, Populus sieboldii, Populus simonii, Populus sp., Populus talassica, Populus tacamahacca, Populus tomentosa, Populus tremula, Populus tremuloides, Populus trichocarpa, Populus tristis, Populus usbekistanica, Populus xacuminata, Populus xberolinensis, Populus xcanadensis, Populus xcanadensis var. serotina, Populus xcanescens, Populus xcathayana-nigra, Populus xcaudina-charkowiensis, Populus xhopeiensis, Populus xrobusta, Prunus domestica, Prunus pennsylvanica, Prunus persica, Prunus spinosa, Prunus virginiana, Quercus palustris, Quercus robur, Quercus rubra, Quercus suber, Robinia pseudoacacia, Salix sp., Salix aegyptiaca, Salix alba, Salix alba var. calva, Salix alba var. vitellina, Salix aegyptiaca, Salix amygdaloides, Salix arctica, Salix aurita, Salix babylonica, Salix bebbiana, Salix carmanica, Salix cupularis, Salix discolor, Salix excelsa, Salix fragilis, Salix interior, Salix laevigata, Salix lasiandra, Salix lasiolepis, Salix longifolia, Salix matsudana, Salix matsudana var. tortuosa, Salix nigra, Salix pentandra, Salix psammophila, Salix purpurea, Salix sp., Sambucus caerulea, Sambucus canadensis, Sophora japonica, Sophora japonica var. pendula, Sorbus americana, Sorbus scopulina, Sorbus sitchensis, Sorbus sp., Spiraea hypericifolia, Tamarix sp., Thuja orientalis, Tilia sp., Triticum sp., Ulmus sp., Ulmus americana, Ulmus pumila, Vitis sp., Vitis vinifera (CABI-CPC).*

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*Symptoms:* *Cytospora* symptoms include bark lesions with dead phloem and cambium, discoloration of the xylem, wood necrosis, and gumming occurring at the canker margin. Cankers can be depressed or sunken, and eventually cause splitting of the bark or girdling of branches. Cankers can be “perennial”, increasing in size each year and becoming unsightly, rough swellings. Cankers are most commonly associated with pruning wounds, sunburn, and other injuries. Inside, cankers are wedge shaped to irregularly shaped vascular discolorations of the xylem tissue below the affected bark area. Infected small twigs and branches can die back without showing cankers.

In stone fruits, the diseased bark becomes dark, smelly, and oozes gum. Later, the bark shrivels and separates from the underlying cambium and from the surrounding healthy bark. Small, pimple-like pycnidia appear on the dead areas. The shriveled bark may slough off. Foliage above a canker will die back. Dieback symptoms were most obvious during the warm summer months (Agrios, 2005; Lawrence et al., 2017, 2018).

*Transmission:* New disease results from infections by conidia. The conidia are produced in pycnidia that form in dead bark around cankers. Perithecia and ascospores (*Valsa*) are occasionally produced in dead bark but are not commonly observed in California and the role of ascospores has not been determined. Pycnidia exude conidia in a yellow, orange to red polysaccharide matrix (cirrus) via an ostiole (Adams et al. 2006). In wet, but not rainy weather, the conidia are exuded and form coiled threads of spores that dry out and harden. These coils of spores can remain on the bark for several days or weeks. Spores of either type may be splashed by rain or may be spread by insects and humans. The majority of infections occur late fall into early winter or in late winter into early spring. Weakened, injured trees may be infected throughout the summer if there is adequate moisture. Both the mycelium and the conidia of the fungus overseason on the infected parts.

Small twigs are infected through injuries or leaf scars. In larger branches, the pathogen can enter through wounds created by pruning, leaf scars, or insect injuries. The mycelium first becomes established in dead bark and wood and from there it invades the surrounding living tissues (Agrios, 2005; Lawrence et al., 2017, 2018).

*Damage Potential:* When *Cytospora* colonizes the periderm and underlying sapwood, it causes brown/black discoloration of the wood and loss of hydraulic conductivity within the xylem, killing branches. Many times, *Cytospora* acts opportunistically, attacking hosts weakened by drought or cold injury, but they can also be facultative wound parasites. *Cytospora* canker diseases can be devastating to perennial fruit tree crops, such as *Prunus persica*, *Prunus armeniaca*, *Prunus avium*, *Juglans regia*, and *Malus* spp. (Rossman et al., 2015; Lawrence et al., 2017). The disease mainly impacts branches but can cause more destructive infections in the larger scaffolds and the trunk, shortening productivity and even the life of orchards (Chang et al., 1991). Tree mortality in affected orchards may reach up to 5% per year, with compounding effects due wood cankers growing and spreading perennially (Grove and Biggs, 2006). *Cytospora* also damages forest and shade trees, such *Eucalyptus*, *Populus*, and *Salix* (Adams et al., 2006), causing limbs to break and shortening the lives of the trees.

**Worldwide Distribution:** Africa: *Morocco*. Asia: *Armenia, Azerbaijan, China, Georgia, India, Iran, Iraq, Israel, Japan, Kazakhstan, South Korea, Turkey, Turkmenistan, Uzbekistan*. Europe: *Austria, Belgium,*

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*Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom.* North America: *Canada, Mexico, United States (Alaska, Arizona, California, Colorado, Connecticut, Florida, Idaho, Illinois, Iowa, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Rhode Island, South Dakota, Texas, Utah, Washington, Wisconsin, Wyoming.* Oceania: *Australia, New Zealand.* South America: *Argentina, Bolivia, Chile, Uruguay.*

**Official Control:** None

**California Distribution:** There are official records from Lassen, Riverside, Santa Clara, and Shasta counties plus a report from Fresno County (Lawrence et al., 2018)

**California Interceptions:** None

The risk *Cytospora chrysosperma* would pose to California is evaluated below.

### **Consequences of Introduction:**

- 1) Climate/Host Interaction:** Detections of *C. chrysosperma* have been made in diverse climates of the state and it occurs in many parts of the world. A wetter climate will favor disease spread, but climate is not likely to be a limiting factor.

Evaluate if the pest would have suitable hosts and climate to establish in California.

**Score: 3**

- Low (1) Not likely to establish in California; or likely to establish in very limited areas.
- Medium (2) may be able to establish in a larger but limited part of California.
- **High (3) likely to establish a widespread distribution in California.**

- 2) Known Pest Host Range:** The host range is very large including many types of trees

Evaluate the host range of the pest.

**Score: 3**

- Low (1) has a very limited host range.
- Medium (2) has a moderate host range.
- **High (3) has a wide host range.**

- 3) Pest Reproductive Potential:** The pathogen spread by splashing spores with limited aerial spread. Spores are protected from drying out and remain infectious over a longer time. Wounding from pruning provides entry points for infection.
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Evaluate the natural and artificial dispersal potential of the pest.

**Score: 2**

- Low (1) does not have high reproductive or dispersal potential.
- **Medium (2) has either high reproductive or dispersal potential.**
- High (3) has both high reproduction and dispersal potential.

- 4) Economic Impact:** *Cytospora* causes damage to many types of fruit, forest, and ornamental trees. It can significantly shorten the life of orchards. Management requires pruning out cankered branches.

Evaluate the economic impact of the pest to California using the criteria below.

**Economic Impact: A, B**

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (includes increasing crop production costs).**
- C. The pest could trigger the loss of markets (includes quarantines).
- D. The pest could negatively change normal cultural practices.
- E. The pest can vector, or is vectored, by another pestiferous organism.
- F. The organism is injurious or poisonous to agriculturally important animals.
- G. The organism can interfere with the delivery or supply of water for agricultural uses.

**Economic Impact Score: 2**

- Low (1) causes 0 or 1 of these impacts.
- **Medium (2) causes 2 of these impacts.**
- High (3) causes 3 or more of these impacts.

- 5) Environmental Impact:** *Cytospora* diseases become more aggressive on trees weakened by drought. California has experienced years of exceptional drought and increased reports of damage from this and other opportunistic wood killing fungi are anticipated.

**Environmental Impact: A**

- A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.**
- B. The pest could directly affect threatened or endangered species.
- C. The pest could impact threatened or endangered species by disrupting critical habitats.
- D. The pest could trigger additional official or private treatment programs.
- E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

**Environmental Impact Score:**

- Low (1) causes none of the above to occur.
  - **Medium (2) causes one of the above to occur.**
  - High (3) causes two or more of the above to occur.
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## Consequences of Introduction to California for *Cytospora chrysosperma*: Medium

Add up the total score and include it here. **12**

-Low = 5-8 points

**-Medium = 9-12 points**

-High = 13-15 points

- 6) Post Entry Distribution and Survey Information:** Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication, or have been delimited with no further detections should not be included.

**Evaluation is 'high'**. Official and research reports show this disease is in multiple areas of the state.

**Score: -3**

-Not established (0) Pest never detected in California or known only from incursions.

-Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).

-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.

**-High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.**

- 7) The final score is** the consequences of introduction score minus the post entry distribution and survey information score: (Score)

**Final Score:** *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 9*

### Uncertainty:

The host range of this pathogen continues to expand. The affect on the California incense-cedar has not fully been evaluated.

### Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for *Cytospora chrysosperma* is C.

### References:

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### Responsible Party:

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**\*Comment Period: 8/10/2020 through 9/24/2020**

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**\*NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

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**Comment Format:**

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

**Example Comment:**

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to “Climate/Host Interaction” here.]

- ❖ Posted comments will not be able to be viewed immediately.
  - ❖ Comments may not be posted if they:
    - Contain inappropriate language which is not germane to the pest rating proposal;
    - Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;
    - Violates agency regulations prohibiting sexual harassment or other forms of discrimination;
    - Violates agency regulations prohibiting workplace violence, including threats.
  - ❖ Comments may be edited prior to posting to ensure they are entirely germane.
  - ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.
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**Proposed Pest Rating: C**

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