



In the Grove: Best Practices for California Olive Oil Growers

Controlling Black Scale

Black scale is one of the more damaging soft scale pests in California. When left unchecked it can reduce tree vigor and productivity.

By getting ahead of the problem, producers can control the spread and resulting damage caused by this pest.

Overview



OOCC Best Management Guidelines.

Controlling Black Scale is one in a series of guidelines on best management practices for olives that the Olive Oil Commission of California (OOCC) has created for growers. Through the best farming and pest management practices possible, the OOCC strives to guide producers in maintaining healthy, productive olive orchards. With the adoption of these smart and research-based practices California's olive oil industry can maximize yields, improve quality, and ultimately increase profits for growers.



How information was obtained.

The information presented in this guideline is from a 2019 literature review titled *Black Scale Control Programs and Carbaryl Alternatives*. By reviewing and analyzing literature on black scale, carbaryl and alternatives to carbaryl the researchers were able to provide a full view of the factors producers should take into account when making pest control decisions and provide recommendations on how to best control black scale.



Who did the research.

The research presented in *Black Scale Control Programs and Carbaryl Alternatives* was conducted by Kent Daane, Cooperative Extension Specialist at the UC Berkeley Department of Environmental Science, Policy and Management and Houston Wilson, Assistant Cooperative Extension Specialist at the UC Riverside Department of Entomology.



How to get the report.

All research reports of the OOCC are posted on our website at www.oliveoilcommission.org. This report is available to view, download or print at <http://www.oliveoilcommission.org/wp-content/uploads/2020/04/Controlling-Black-Scale-Final-.pdf>

Read the full literature review on *Black Scale Control Programs and Alternatives to Carbaryl* [here](#).

Contact Information for the OOCC: If you have questions please don't hesitate to contact the OOCC at: (916) 441-1581 or info@OliveOilCommission.org.



What Is **Black Scale**

Black scale (*Saissetia oleae*) is a soft scale sucking insect that excretes large amounts of honeydew (a sugar-rich liquid) onto olive trees, which serves as a surface for the development of sooty mold.

Why It's Important to Control

Black scale is one of the more damaging soft scale pests in California and when left unchecked has the ability to cause damage to trees including reduction in tree vigor, productivity and bloom the following year. By getting ahead of the problem, producers can control the spread and damage caused by black scale and ultimately increase their own profits through better yields.



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*Jack Kelly Clark, courtesy University of California
Statewide IPM Program*

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Identifying

Black Scale

Adults are small (0.2 inches diameter) and dark brown or black. Scale eggs hatch into tiny crawlers that are lighter in color (yellow to orange) and spend a few days distributing themselves across the leaves and branches in search of an optimal feeding site. Once settled, it inserts its mouthpart into the plant and begins to feed. The immature scales then pass through three developmental stages that develop a distinct “H” pattern on their backs. Black scale generally has one generation per year inland and two in cooler coastal areas.

The presence of ants is sometimes the first indication of black scale infestation. Ants will “farm” the scale, collecting the honeydew and protecting the scale from natural enemies.

Damage to Olive Oil Trees

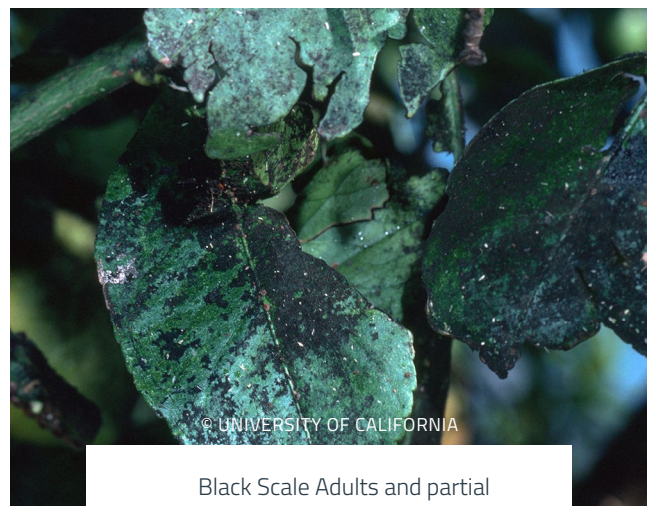
Black scale infestations on olive trees can cause leaf drop, reduce productivity and can impact bloom in the following year. Most damage is caused during the spring to summer when scale grows rapidly, leading to more honeydew excretion and sooty mold accumulation.



Black Scale eggs and crawlers



Black Scale second and third stages



Black Scale Adults and partial defoliation and mold damage

Jack Kelly Clark, courtesy University of California Statewide IPM Program

Monitoring

Information in this section is from the UC Statewide IPM website. To read the full report please visit: www2.ipm.ucanr.edu/agriculture/olive/Black-scale

Typically, the first sign of a black scale infestation is honeydew on leaves. Check for the presence of honeydew in April and October when accumulation is typically the highest. To identify how widespread black scale is in an orchard sample for adults in May and focus on two or three areas in each block. When sampling for adults:

- STEP 1** — Select 10 trees in each area.
- STEP 2** — On each of the 10 trees count the number of black scale adults on the terminal 18 inches of 10 branches. Include outer, inner and bottom sections of each tree to get a thorough sample.
- STEP 3** — Add the total number of adults from all trees and branches sampled and divide by the total number of branches sampled.

FOUR LEVELS OF INFESTATION

1. LIGHT INFESTATION

A light infestation is considered 0 to an average of 1 black scale adult per branch and typically does not require treatment in open canopy orchards. Closed canopies should be pruned to allow more sunlight and an application of a dormant oil considered.

2. MODERATE INFESTATION

Moderate infestations consist of 1 to 4 adults per branch and have the ability to cause damage and financial loss in the next year's crop. To treat a moderate infestation, apply a narrow range oil if the summer is mild. On closed canopy orchards, prune and apply oil or a combination of oil and insecticide to treat.

3. HEAVY INFESTATION

4 to 10 adults per branch indicates a heavy infestation. In this case there is potential for severe crop loss in the next year. To treat, canopies must be pruned and chemically treated.

4. SEVERE INFESTATION

Severe black scale infestations are indicated by 10 or more adults average per branch. In this case, prune orchard and remove all severely damaged branches. Treat with an insecticide in mid July, after crawlers have hatched but before the insect will cause damage to next year's crop.

Control Strategies



Cultural/Mechanical

The temperature and humidity of an olive orchard have a direct link to the likelihood of a black scale outbreak occurring. Scale mortality rates are higher in hot dry weather. Therefore, pruning for an open canopy that is more exposed, thereby increasing temperature, is beneficial. This tactic can be effective in hot inland areas.

High density or “hedge” style groves, while beneficial to production, could lead to increased black scale populations due to a more closed canopy. Furthermore, high-volume sprinkler systems can also lead to a greater risk of scale outbreak due to lower temperature and higher humidity levels, producing a cool and moist environment.

Biological

There are numerous natural enemies to black scale in California. While these parasites and predators are effective at decreasing black scale populations they are susceptible to certain pesticides such as carbaryl.

Another problem for natural enemies is that ants tending the scale reduce rates of parasitism and the common control for ants is an application of carbaryl.

Natural Predators of Black Scale



Metaphycus lounsburyi adult females attack by placing their egg underneath a mature scale, where the resulting parasitoid larva feeds on the deposited eggs of the black scale.



Metaphycus helvolus was reported to reduce scale incidence by 85-90% after its introduction to California in 1937.



Exit holes from Scutellista caerulea, a natural enemy imported from S. Africa in 1898 and one of the first natural enemies introduced to CA. Jack Kelly Clark, courtesy University of California Statewide IPM Program



Mature female black scale with Argentine ants. David Rosen, courtesy University of California Statewide IPM Program

Chemical Controls & Alternatives to Carbaryl

Chemical controls are effective at decreasing black scale populations, but it is difficult to establish biological controls for black scale when applying the standard pesticide program against this pest. Oil-only spray is the best chemical control option for reducing black scale populations while causing little harm to natural enemies.

Other chemical controls include insect growth regulators such as pyriproxyfen and buprofezin, or other systemic products like spirotetramat or the neonicotinoids — imidacloprid and acetamiprid. Carbaryl, while effective for black scale control, is also toxic to numerous beneficial insects including parasitoids and honey bees.

Maximum Residue Limits: Pesticides for Scale Control

MRLs for key active ingredients for current or potential control of black scale. Data is presented as parts-per-million (ppm) for 'table olives/olive oil.' Source: Global MRL Database (2018)

Country	Carbaryl	Spinosad	Fenpropathrin	Buprofezin	Pyriproxyfen
United States	10 / -	0.02 / -	5 / -	3.5 / 4.8	1 / 2
Canada	10 / -	0.1 / -	5 / -	5 / -	1.5 / 2
Mexico	10 / -	0.002 / 0	5 / -	3.5 / 4.8	1 / 2
European Union	0.01 / 0.02	0.02 / 0.02	0.01 / 0.01	5 / 5	0.05 / 0.05
Japan	30 / 25	0.3 / -	5 / -	5 / -	1 / -
Taiwan	0.5 / -	0.01 / -	0.01 / -	1 / -	0.01 / -

Chemical Control Regulations

Carbaryl

Heavily restricted in the European Union and may be subject to US federal and state restrictions in the near future.

Pyriproxyfen

Regulated in the European Union and Taiwan.

Buprofezin

Tolerance levels are equivalent or higher than domestic standards in Canada, Mexico, European Union, and Japan. Only in Taiwan is it more restricted.

Novel Products

MRLs on olives have not been established for tolfenpyrad, sulfloxaflor, and flupyradifurone or any of the systemic products (imidacloprid, acetamiprid, spirotetramat).

To read the full research report on *Black Scale Control Programs and Alternatives to Carbaryl* please visit the research archive on the OOCC website:

www.oliveoilcommission.org/research.

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