IPM for Camellia and Buxus

Steven Swain
Environmental Horticulture Advisor
Marin & Sonoma Counties

Diagnosis?

- UC IPM is a good start
  - http://ipm.ucanr.edu/
  - But it doesn't cover everything
  - Especially in the bay area

Skipping …

- Vertebrate damage
  - Venison, anyone?

Skipping …

- Vertebrate damage
- Aphids

Skipping …

- Vertebrate damage
- Aphids
- Armored scales

Skipping …

- Vertebrate damage
- Aphids
- Armored scales
- Glassy winged sharpshooter
  - Because it's not here

Skipping …

- Vertebrate damage
- Aphids
- Armored scales
- Glassy winged sharpshooter
- Mealybugs

Image: American Camellia Society

Skipping …

- Vertebrate damage
- Aphids
- Armored scales
- Glassy winged sharpshooter
- Mealybugs
- Soft scales

Skipping …

- Vertebrate damage
- Aphids
- Armored scales
- Glassy winged sharpshooter
- Mealybugs
- Soft scales
- Whiteflies

Skipping …

- Vertebrate damage
- Aphids
- Armored scales
- Glassy winged sharpshooter
- Mealybugs
- Soft scales
- Whiteflies
- Fuller rose beetle
  - Root damage?

Skipping …

- Leaf gall
  - Exobasidium vaccinii
  - Theacea and Ericaceae were once synonymous

Image: LSU Ag Center

Skipping …

- Leaf gall
- Sooty mold
  - Look for homopterans

Skipping …

- Leaf gall
- Sooty mold
- Viruses
  - Symptom pattern is diagnostic
  - ELISA tests, if you need to be sure

Skipping …

- Leaf gall
- Sooty mold
- Viruses
- All covered by UC IPM
- Diagnosis isn't hard

Image: Royal Horticultural Society

Not so easy ...

- Black vine root weevil
  - Otiorhynchus sulcatus
- Adults feed on
  - Leaves
  - Blossoms
- Grubs feed on roots
  - Extensive damage
  - Infection route for soilborne Phytophthoras
  - Check roots
    - Nematodes
    - Soil applied insecticides

Image: Researchgate.net

Not so easy ...

- Bud mites
  - All microscopic (?)
  - Jalapenos w 4 legs
  - *Acaphylla steinwedeni*
    - Bronzes leaves
  - *Calacarus carinatus*
    - Bronzes upper leaf
    - Curls edges
  - *Cosetacus camelliae*
    - Browning bud scales and floral parts
    - Premature bud drop
- Cultural Rx only
  - Other mites
  - Commercial insectaries?

Theaceae

***Camellia japonica* L. Common Camellia**

Discoloration of leaves, floral parts, and bud scales caused by *Acaphylla steinwedeni* Keifer, *Calacarus carinatus* (Green) (= "*Epitrimerus*" *adornatus* Keifer), and *Cosetacus camelliae* (Keifer) (pl. 59)

The following three eriophyid mites are serious pests of camellia:

Acaphylla steinwedeni is a leaf vagrant that occurs on camellia leaves with *Calacarus carinatus*. Infestation may cause bronzing of the leaves. The mite is spindle shaped and yellow or orange; the dorsal setae are very short; the featherclaws are curiously bifurcate and three-rayed; and the hysterosoma has microtubercles ventrally. The bifurcate featherclaws readily separate *A. steinwedeni* from *C. carinatus*. Both species overwinter on the leaves. The former has been found only on camellia in California, Alabama, and Florida.

Calacarus carinatus is another leaf vagrant that causes bronzing of the upper surface and downward folding of the leaf edges. It also deposits debris on the leaves as white streaks of cast skins. The mite is spindle shaped and striking in appearance because of its purple color and the waxy exudates that form ridges on the dorsal shield and hysterosoma. The dorsal setae are absent, the featherclaws are five-rayed, and the hysterosoma has microtubercles ventrally. *Calacarus carinatus* infests camellia and also cranberry bush (*Viburnum opulus* L., Caprifoliaceae), but no injury has been observed on the latter. It has been reported in California, Florida, and Georgia.

Cosetacus camelliae is found under flower bud scales. Colonization of the buds results in browning at the edge of bud scales and floral parts. The flower buds turn brown and drop before blooming, and, according to Gibson (*1967*), dropping of buds, distortion of opening flowers, and premature drop of flowers occur. The mite also causes leaves to appear rusty. *Cosetacus camelliae* is white and wormlike; the dorsal setae are long and directed backward; the featherclaws are six-rayed; and the hysterosoma is completely covered with microtubercles. This mite occurs in California, Florida, and probably much of the Southeastern United States on camellia.

References: Denmark, *1965: 1*]; Gibson, *1967: 663;* Johnson and Lyon, *1976: 424;* Keifer, *1940a: 32; 1943: 215; 1945: 137.*

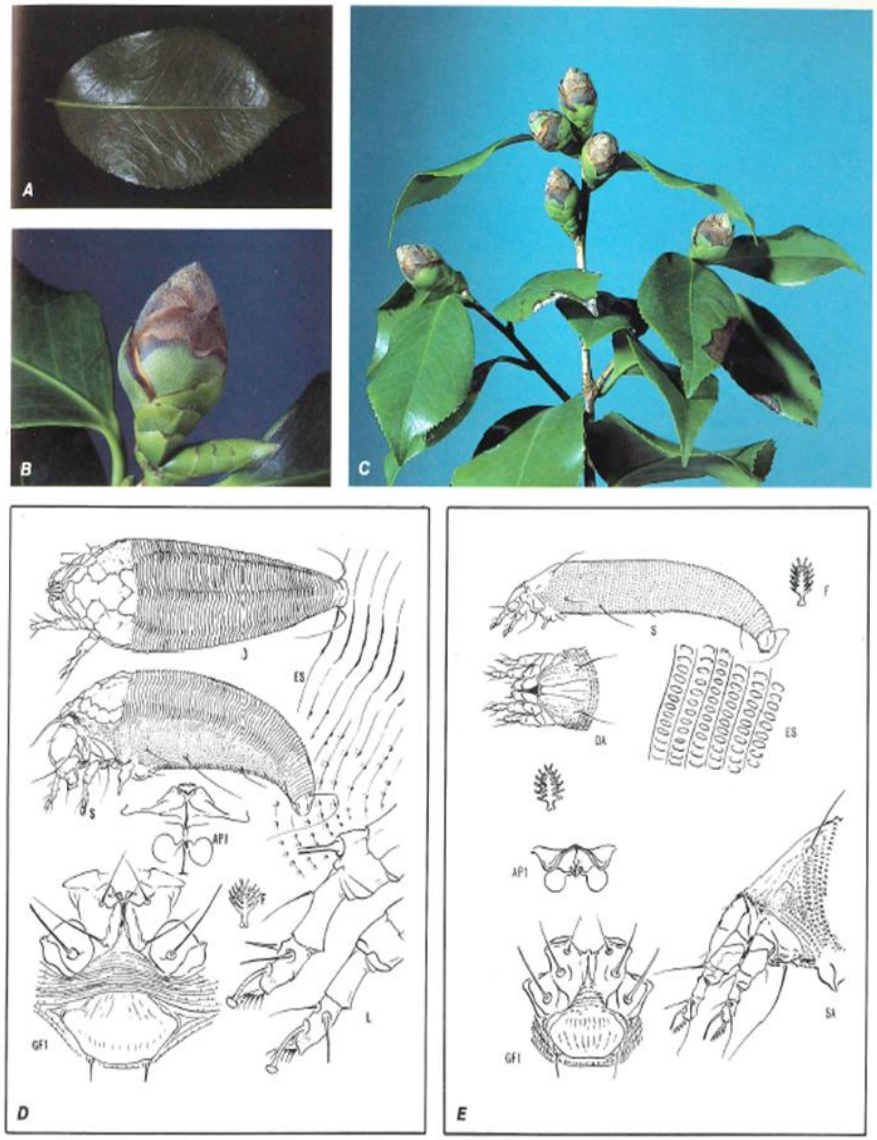


PLATE 59.—*A*, Bronzing of camellia leaf; *B, C*, damaged camellia buds, showing browning of bud scales; *D, Calacarus carinatus* (Green); *E, Cosetacus camelliae* (Keifer).

- Reference out of print
- Keifer, HH; Baker, EW; Kono; Tokuwo; Delfinado, Mercedes, Styer (1982) An illustrated guide to plant abnormalities caused by eriophyid mites in North America. USDA Agricultural Research Service. Agricultural Handbook Number 573
- Don’t fret, it’s posted here:
- https://naldc.nal.usda.gov/download/CAT87208955/PDF

Not so easy ...

- Nematodes
  - Root lesion
    - (*Pratylenchus spp.)*
    - Loss of vigor, stunting
    - Loss of winter hardiness
  - Root knot
    - *Meloidogyne spp.*
    - *M. camelliae?*
- Sergei Subbottin CDFA
- Treatment?
  - Sanitation
  - Non-host crop rotation
    - Some marigolds
  - Nematicides?

Not so easy ...

- Camellia blight
  - *Ciborinia camelliae*
  - Symptoms only in petals
  - Start in center of flower
  - Petal veins dark
  - Cycle
    - 60-70°F & humid or wet
    - Flowers drop
    - Sclerotia survive in soil
    - Apothecia discharge spores

Not so easy ...

- Looks like Botrytis
- Management
- Clean soil
  - Top few inches
  - Dispose of debris
    - Not in home compost
  - Several inches of clean organic mulch (compost?) every year

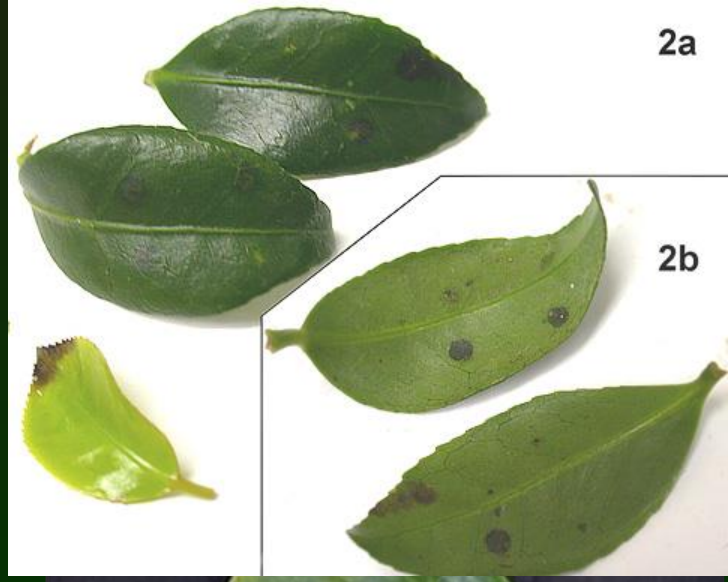
Not even mentioned

- Sudden oak death
- Susceptibility varies by cultivar
- Symptoms
  - Leaf spots that frequently follow mid-veins
  - Leaves drop before (?) infection reaches twigs
  - Leaves still infectious
  - Symptoms vary by cultivar
  - Some infected leaves are asymptomatic

Images: Steve Tjosvold, UCCE

Not even mentioned

- Symptoms vary by cultivar



White images: Nina Shishkoff

Not even mentioned

- Symptoms vary by cultivar
- Some cannot stop infection prior to twig infection
- Root infections are asymptomatic

Boxwood Blight

Calonectria pseudonaviculata
(=Cylindrocladium buxicola, anamorph*)*

Black Longitudinal Lesions

Found on east Coast in 2011

Images: Kathy Kosta, CDFA

Easily moved by touch
Sweeps through plantings quickly
Humid and rainy conditions promote spread

Images: Kathy Kosta, CDFA

The fungus grows in leaves and stems.
Leafy debris harbors the pathogen
and infests the soil for at least 5 years.

Images: Kathy Kosta, CDFA

Other Diseases of Boxwood With Similar Symptoms

- *Volutella* – branches +

- Winter Browning

Phomopsis dieback – tips, small black dots

Images: Kathy Kosta, CDFA

If you see this, call your Local Agricultural Commissioner

Look for the black stem lesions!

Images: Kathy Kosta, CDFA


Image: Mary Ann Hansen, Virginia Tech
5507242

Treatment

Take extreme caution in disposal

Wear disposable gloves, booties and suits if possible

Double bag and safely transport to the landfill

Sanitize all equipment used

Slide: Kathy Kosta, CDFA

Boxwood Blight Identification Guide

INITIAL SYMPTOMS

Dark leaf spots (left) and spores of the boxwood blight fungus (*Calonectria pseudonaviculata)* on lower leaf surfaces (right).

Zonate leaf lesions.

Black stem lesions.

LANDSCAPE AND NURSERY SYMPTOMS

Foliar and stem symptoms result in severe defoliation leading to decline and death of boxwood plants. Boxwood blight affects all species of boxwood, pachysandra, and sarcococca.

Infected boxwood and pachysandra in the landscape (left) and leaf spots on pachysandra (right).

Stem lesions on pachysandra (left) and fungal spores on lower surface of pachysandra leaves (right).

All photos from CAES.
Funding from FY2013 Farm Bill, USDA-APHIS.

For more information:
www.ct.gov/caes/boxwoodblight
www.boxwoodblight.org

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Lots of Info on the Internet

[PDF] Best Management Practices for Boxwood Blight in the ... - Virginia Te...
https://pubs.ext.vt.edu/PPWS/PPWS-29/PPWS-29-pdf.pdf
tria pseudonaviculata1, is a serious fungal disease of boxwood that results in defoliation and decline of susceptible boxwood. In Virginia **boxwood blight** was first ...

[PDF] Prevention and Management of Boxwood Blight - NC Cooperative ...
https://www.ces.ncsu.edu/wp-content/uploads/.../**Boxwood-Blight**-Guide-01.03.13.pdf
Common names of the disease: **Boxwood blight**, box blight, Cylindrocladium box ... Scientific name: Most literature refers to the fungus that causes box blight as ...

[PDF] Boxwood Blight--A New Disease for Connecticut and the US - CT.gov
www.ct.gov/.../**boxwood_blight-_a_new_disease_for_connecticut_and_the_u.s.__12-**...
by SM Douglas - Cited by 3 - Related articles
was tentatively identified as **boxwood blight**, caused by the fungus Cylindrocladium buxicola (syn. C. pseudonaviculatum). Since this fungus had not been ...

Boxwood blight - Wikipedia
https://en.wikipedia.org/wiki/**Boxwood_blight**
Boxwood blight is a widespread fungal disease affecting boxwoods caused by Cylindrocladium buxicola (also called C. pseudonaviculatum). Contents. [hide].
History · Hosts · Symptoms and disease process · Prevention and treatment

Boxwood Blight | Fine Gardening
www.**finegardening.com/boxwood-blight**
Since the first confirmed case in the United States about a year ago, **boxwood blight** (caused by Cylindrocladium pseudonaviculatum) has spread to 10 states ...

Boxwood Blight-Cylindrocladium buxicola - Saunders Brothers
www.**saundersbrothers.com/index.cfm/fuseaction/home.showpage/.../index.htm**
Boxwood Blight Update. We hope everyone is having a great winter, but more importantly, we hope everyone is ready for spring to start very soon. We are back ...

Image: Kathy Kosta, CDFA


Photo: Zach Vought, UFA

Calonectria (laurel)

- Leaves:
  - Turn yellow
  - Turn black
  - Fall by the hundreds
  - Tree defoliated
    - Some new growth
- Reported in
  - Santa Cruz
  - East bay
- Similar symptoms seen here

Thanks!

- Presentation on-line tomorrow at:
  http://ucanr.edu/gardenwalks
- Steven Swain: 415 473 4226
  svswain@ucanr.edu