2025 NSCH Program Update

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CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

Almond Red Leaf Blotch
Aloe Rust
Mango Malformation

- California grows 80% of the global almond crop and 100% of the supply for the U.S.
- Our hot, dry, summers and mild winters plus our water infrastructure in the Central Valley provide ideal growing conditions for almonds.
- In 2023, almonds were California's 5th most valuable commodity and the highest-value export crop, grown on 1.25M acres and worth $3.9B.
- The largest almond-growing counties are Fresno, Kern, Stanislaus, Merced, and Madera, and they account for 75% of the total acreage.

Photo: CA Almond Board

Red leaf blotch is an important foliar fungal disease in some of the world's major almond production regions

The disease is widespread in the Mediterranean regions of Europe and Africa and in Asia

Almond Valley, Mallorca

Red leaf blotch disease has two hosts

Cultivated almond - *Prunus dulcis*

Manteca/Ripon Bulletin

Wild almond - *Prunus webbii*

Almond crop yields threatened by disease new to California

Jul 16, 2024 Agriculture Food Pest Management

First detection of red leaf botch disease in the Americas made by UCCE Specialist Florent Trouillas

CDFA official samples have confirmed the disease is in Fresno, Madera, Merced, San Joaquin and Stanislaus counties

Recent 2025 reports of the disease in Yolo, Kings and Tulare counties

Almond Red leaf blotch disease has quickly become widespread in California

- Currently B-rated
- Could be spread to new counties with diseased nursery stock

Red leaf blotch is caused by a biotrophic ascomycete fungus-

Polystigma amygdalinum

The genus is characterized by its brightly colored stromata, occurring on living leaves of *Prunus*

Megan Romberg, USDA

Ascomycetes – Sac fungi

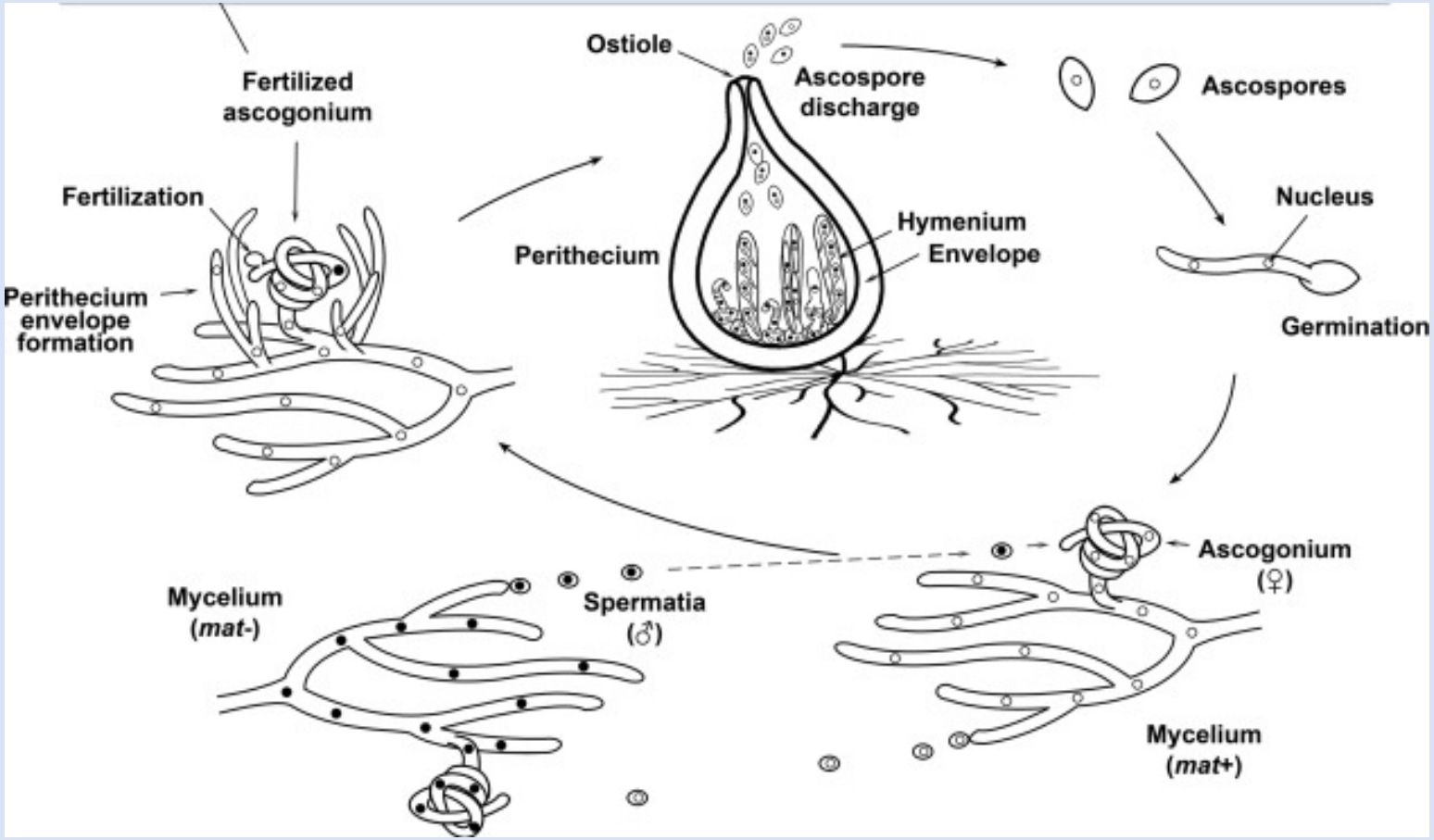
Polystigma amygdalinum Cannon, 1996

Order: Phyllachorales

-Perithecia in stroma

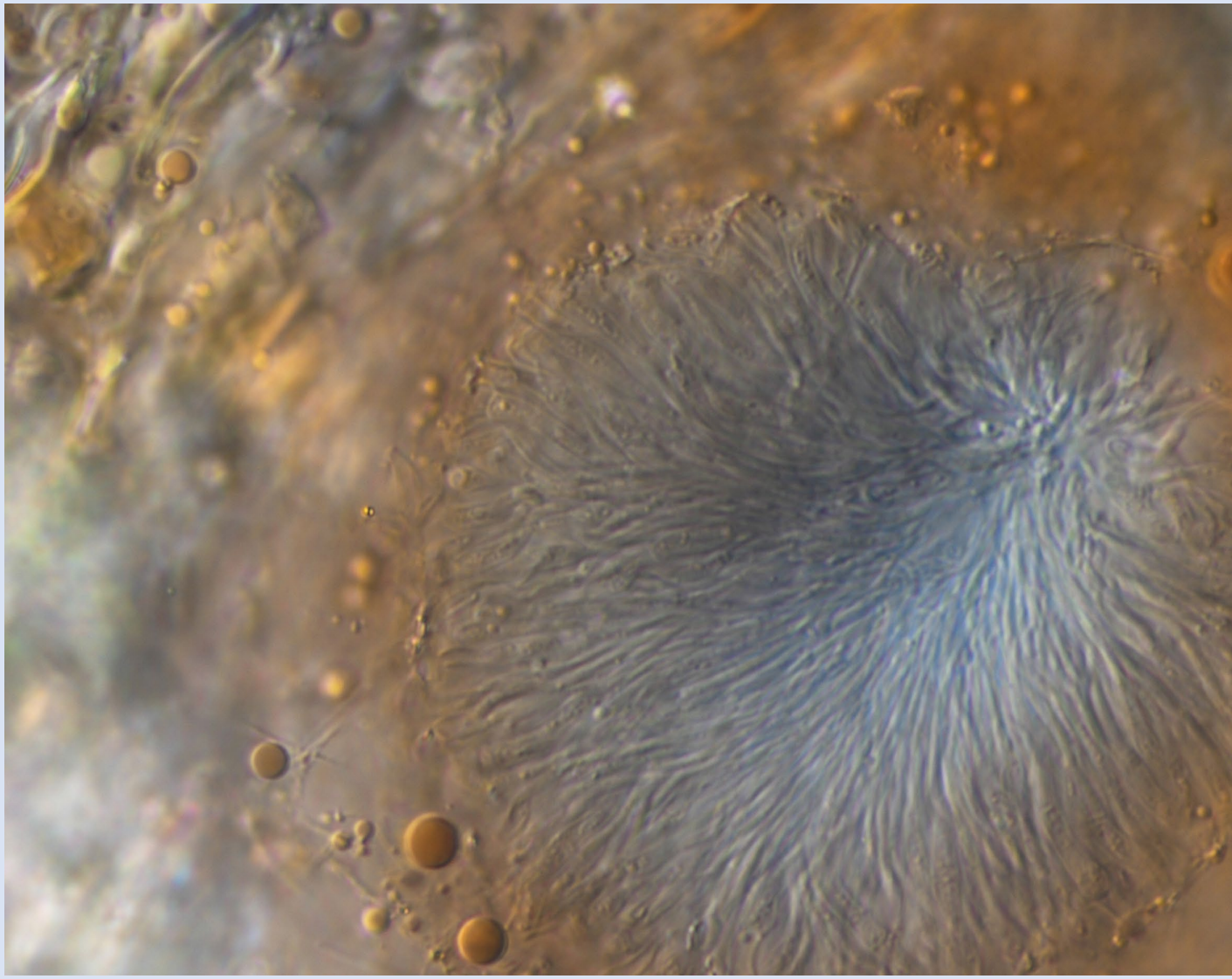
-Ascospores of varying shapes, hyaline or dark, generally in groups of eight within an ascus.

-Ascospores infect almond leaves



Polystigma amygdalinum

Monocyclic disease
Pathogen completes just one life cycle per season
Only has ascospores and spermatia to make more ascospores
Does not have an asexual stage or a repeating spore cycle (spermatia are not infectious)
Cannot be grown in culture and lives only within the almond leaves
PCR amplification of the ITS region is used to generate DNA sequence data for the ID



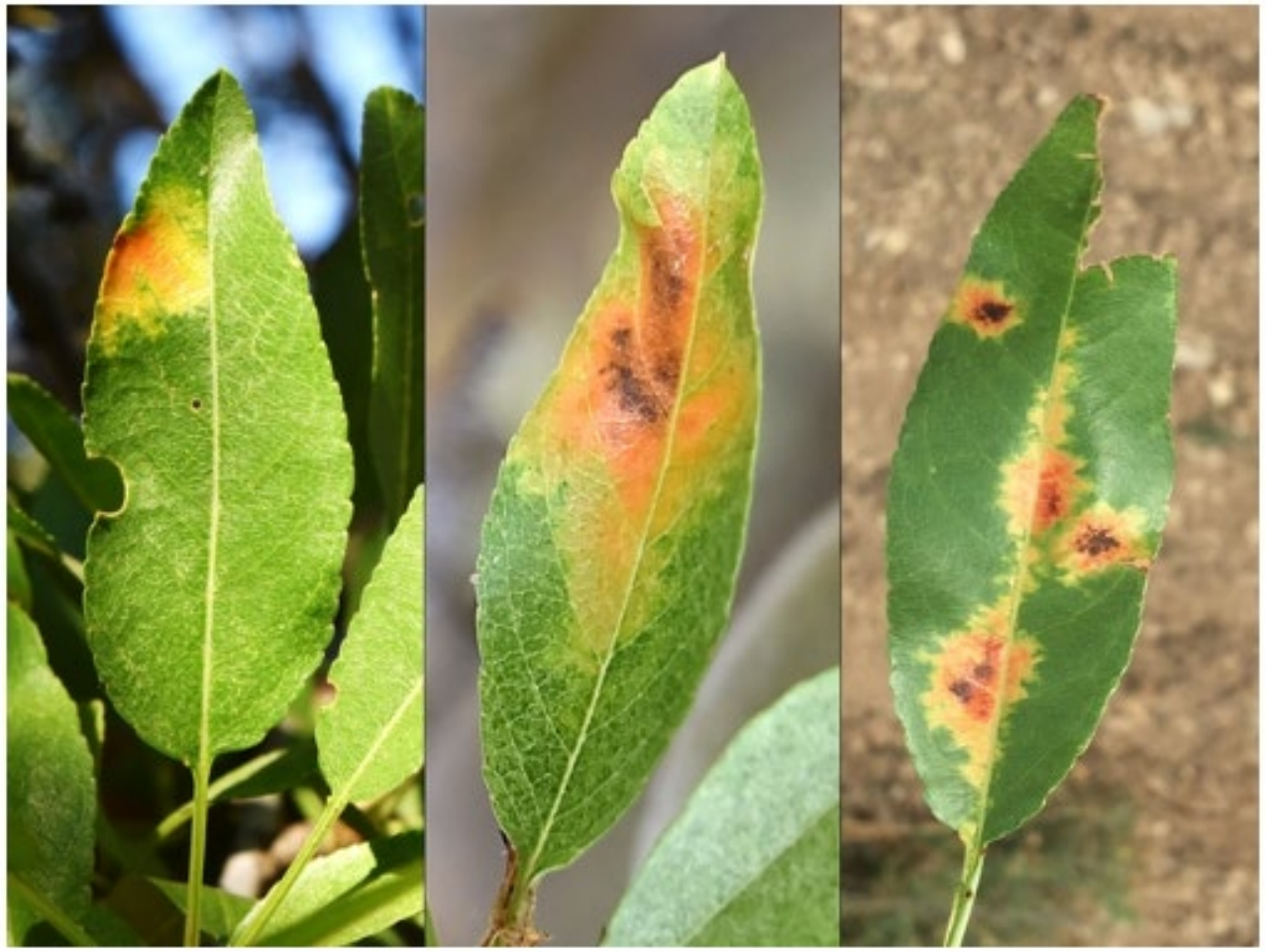
Early symptoms of red leaf blotch include small, pale yellowish spots or blotches that affect both sides of the leaves. Photo credit: Alejandro Hernandez and Florent Trouillas

Red leaf botch disease

Infection typically happens at petal fall, when small leaflets are first emerging and most susceptible to infection from ascospores

The earliest disease symptoms appear in mid-May and continue to develop during the summer months.

Symptoms begin as pale green to yellowish spots on both leaf surfaces.



Advanced symptoms of red leaf blotch (RLB) include large, yellow-orange blotches (roughly 1/2") that turn reddish-brown in their center. Photo credit: Alejandro Hernandez and Florent Trouillas

Red leaf botch disease

Blotches become yellow-orange and then reddish-brown in the advanced stages of the disease during June and July.

Leaves twist and fall prematurely from the tree.

No fungal structures grow on the outside of the leaves.

The fungus does not infect wood or kill trees.

Disease inoculum comes from the infected leaves that have fallen to the ground

The ascospores are released in late winter and early spring and spread in the air to infect new almond leaves

Red leaf blotch disease does not directly affect almond hulls or nuts.

San Joaquin Co. almond orchard

Severe infections under hot and dry conditions can induce an early leaf fall in summer, thus reducing the photosynthetic activity of trees, and can diminish crop yields in the current year and the next

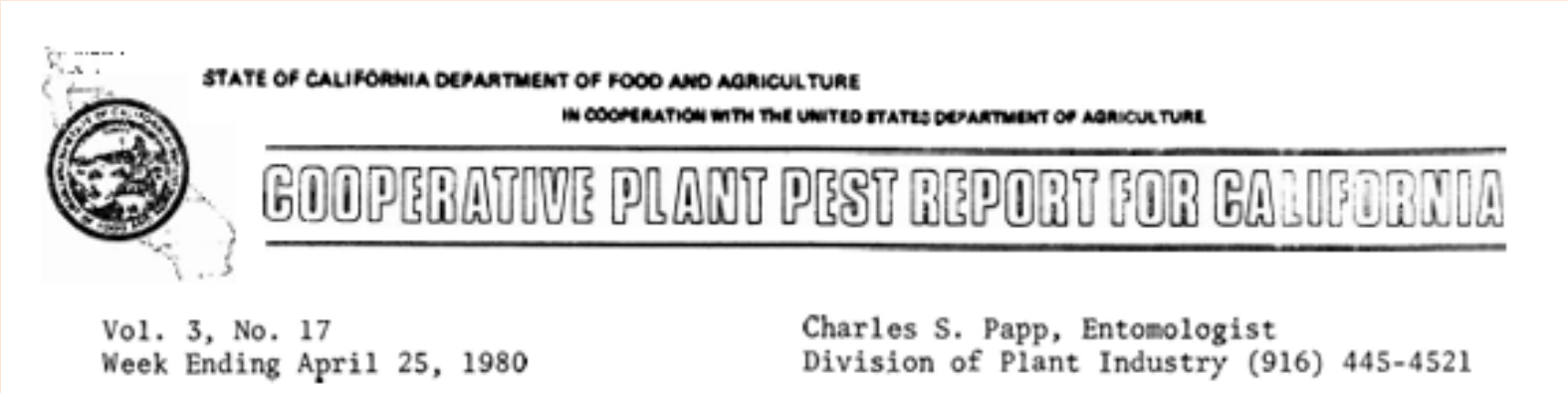
CDFA Pest Exclusion collecting leaf samples

CDFA is interested in samples from any new Counties – with a B-rating, needs to be eradicated in nurseries

Aloe Rust

Uromyces alöes

History of aloe rust in California



STATE OF CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

IN COOPERATION WITH THE UNITED STATES DEPARTMENT OF AGRICULTURE

COOPERATIVE PLANT PEST REPORT FOR CALIFORNIA

Vol. 3, No. 17
Week Ending April 25, 1980

Charles S. Papp, Entomologist
Division of Plant Industry (916) 445-4521

1978 – Nursery Detection in San Diego County (no details)

1980- Detection in Santa Barbara County, 200 plants/5 Aloe species

1982 - Aloe rust receives an A-rating

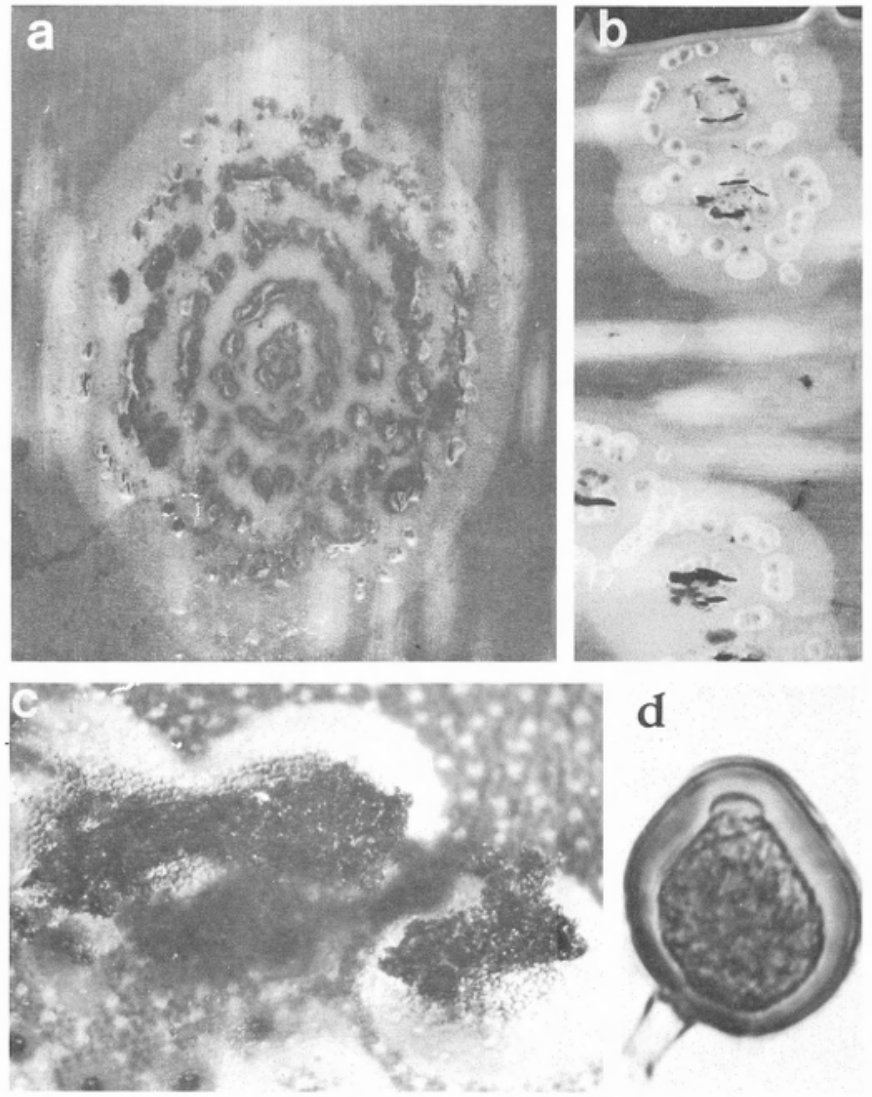
RUST OF ALOE, *UROMYCES ALOES*

T. T. Matsumoto, W. Gillette, D. Supkoff
and C. Fukushima

The only known infestation of *Uromyces aloes* in North America is in a private exotic garden in Santa Barbara County. Previously, the only report of this disease was made in 1978 by Kenneth Sims in a San Diego County Nursery (3). At that time, all the infected aloe plants were destroyed. Detection surveys by CDFA and county agricultural personnel are being conducted to determine the disease distribution in California. Rust of aloe is a regulatory disease which has a CDFA "A" rating.*

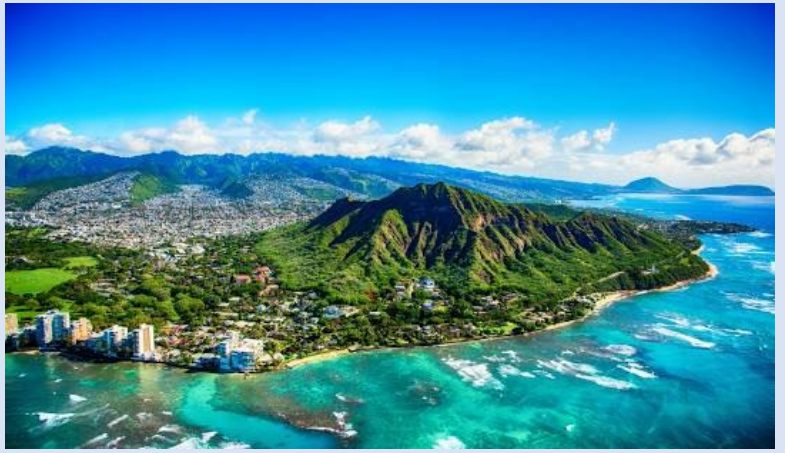
The geographical distribution of this disease (2,4) includes the following areas: Africa (Ethiopia, Kenya, Losotho, Madagascar, Malowi, Rhodesia, Tanzania and Uganda); Europe (United Kingdom); and Asia (India and Japan).

Early stages of infection are marked by a single, circular arrangement of pustules or "sori", eventually developing into concentric arrangements of sori up to 5 cm in diameter (Fig. a, b). The sorus contains numerous teliospores (Fig. c). Teliospores are generally globoid to ovoid (20-35 x 22-55 u), with walls 4-7 u thick and hyaline pedicels (Fig. d).



October 2020

CDFA is notified by the Hawaii Dept of Ag of a detection of aloe rust at a nursery in Honolulu County.



3,850 km

The rooted cuttings were shipped to Hawaii from San Mateo County. Trace backs did not find any infected aloes at the nursery.

16,602 km

Further traceback investigations from CDFA's Pest Exclusion branch determined that the plugs originated in Zimbabwe in Southern Africa and were rooted in California.

2021 Report from Pennsylvania

Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Aloe vera* Rust Caused by *Uromyces aloes* in an Ornamental Nursery in the United States

Devin Bily,[1,†] Ekaterina Nikolaeva,[1,†] Tracey Olson,[1] Scott Rebert,[1] Seogchan Kang,[2] and Cody Molnar[1]

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[2] Department of Plant Pathology and Environmental Microbiology, Pennsylvania State University, University Park, PA 16802

Plant Dis. 105:3739, 2021; published online as https://doi.org/10.1094/PDIS-05-21-1009-PDN. Accepted for publication 6 June 2021.

Teliospores of *Uromyces aloes*

A leaflet of *Aloe vera* infected by *Uromyces aloes*

"Infected plants were confined inside a greenhouse and have been destroyed. Because the plants were purchased from *either* Florida or Ontario, Canada, the extent of infection in the United States is unknown."

Summer 2024

A private plant pathology diagnostics lab in Orange County contacted CDFA to report a suspect aloe rust sample.

CDFA’s Pest Exclusion Branch traced the sample to a wholesale nursery in Monterey County.

Monterey Ag Comm inspectors visited the nursery and, in one greenhouse, identified suspect positives. The plants were submitted to CDFA’s Plant Pest Diagnostic Center at Meadowview.

CDFA Plant Pathologist Wei Belisle identified *Uromyces aloës* by morphology and PCR with DNA sequencing.

The diagnosis of aloe rust was confirmed by the USDA's National Diagnostician in Maryland. This rust is a U.S.-regulated pest.

Monterey Ag Comm supervised fungicide applications, followed by delimitation. Out of nearly 200,000 plants, 17 were confirmed positive. After treatment, plants were reinspected and released. Additional traces were made to San Diego County.

The origin of the plants was either Guatemala or Zimbabwe, or both.

Over 35 species and varieties of aloes are recorded hosts of aloe rust.

Most records are from Southern Africa









Haworthia can also be hosts of *Uromyces aloës*

(no photos of symptoms)

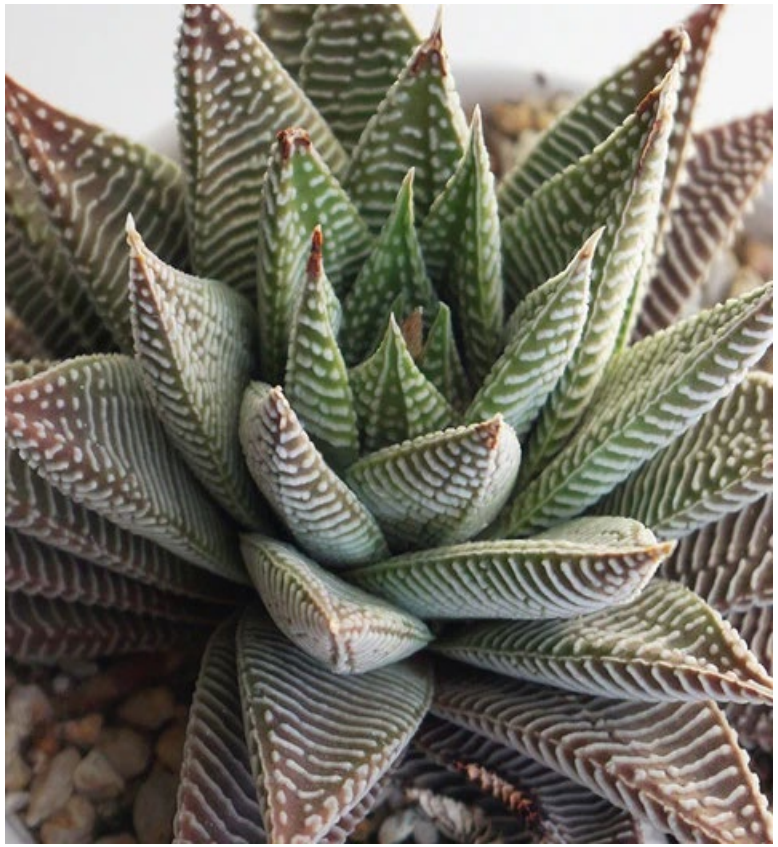
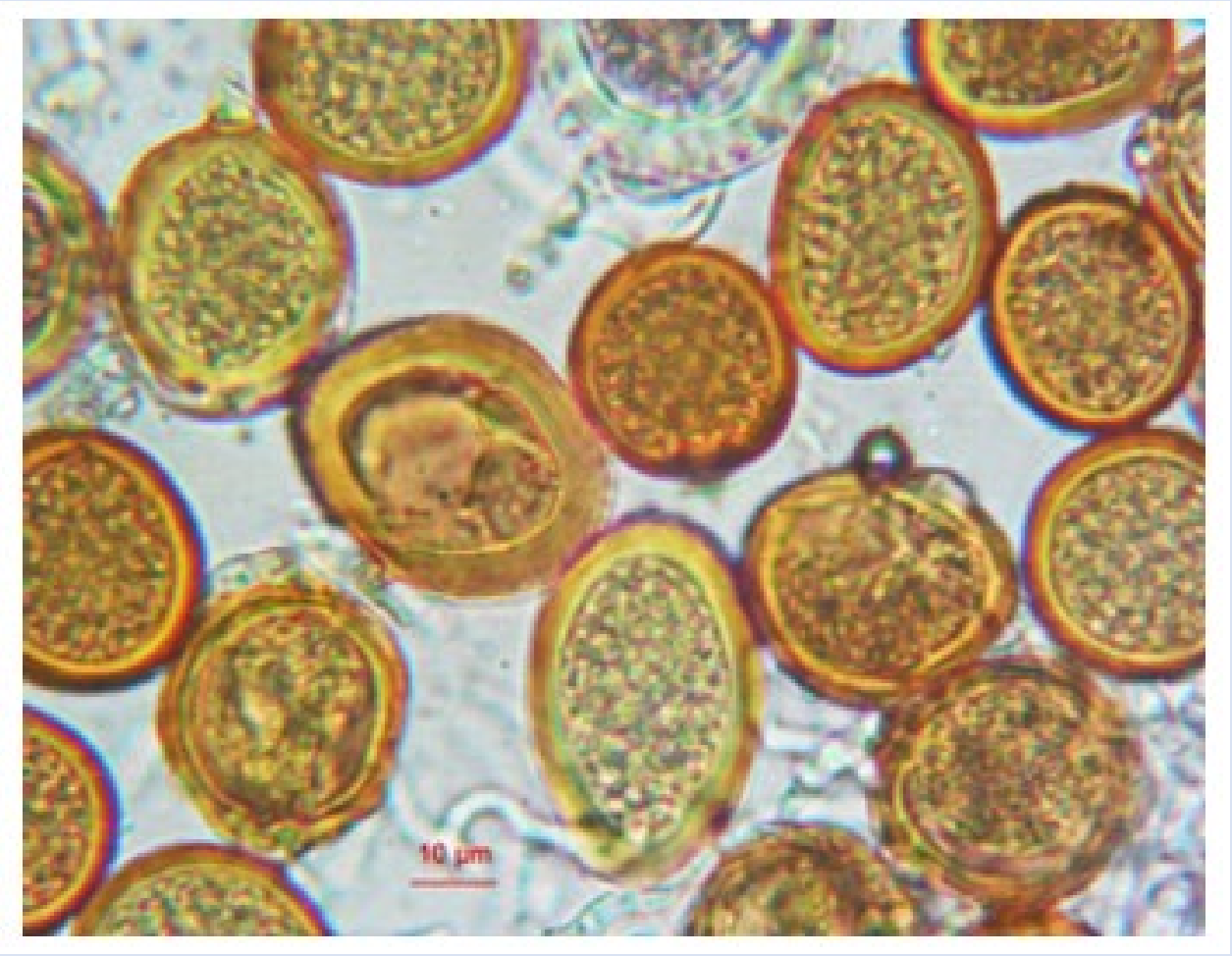


Photo: thenextgardener.com

One record from 1980 in Santa Barbara on *Agave* sp.

worldofsucculents.com



Carnets natures, 2015. vol 2: 41-42

Aloe rust teliospores

Uromyces aloës is a microcyclic rust, producing only teliospores (Stage III) and basidiospores (Stage IV). It is an obligate parasite, requiring a living host to parasitize. It can complete a life cycle on a single host without an alternate host.

Long distance spread is with infected nursery stock

Greenhouse conditions are favorable for disease development

Monterey County Ag Comm

sunbirdaloes.co.za

If you find an aloe rust suspect anywhere:

- Take sample and send to CDFA

- Samples from new counties will go to the USDA for confirmation

If an Inspector finds an aloe rust suspect in an incoming shipment :

They will secure the plants in plastic bags at the Carrier or the Nursery until confirmed by the lab.

Make copies of all shipping documents, including any invoices, phytosanitary certificates, or 008’s; photograph any markings on the boxes.

inaturalist.org/observations/141986794

If there is an aloe rust suspect at a Nursery :

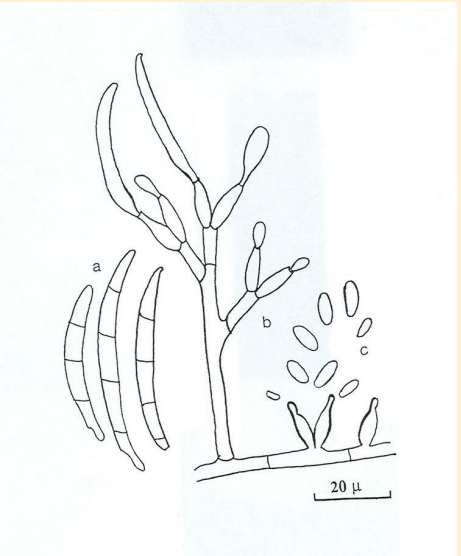
Call your County Ag Comm. They will place all host plants on written hold until confirmed by our Lab.

Inspectors will delimit and sample each species or variety with symptoms separately, and ask for traceback and traceforward information.

inaturalist.org/observations/192057063

Mango malformation disease

Fusarium mangiferae



Mangos are grown in backyard orchards in parts of Southern California, from Santa Barbara to San Diego. Riverside County has limited acreages of commercial production in the Coachella Valley.

Mangoes cannot tolerate frost and require warm, dry weather to produce fruit.

Temperatures below 40F damage flowers and developing fruit; temperatures below 30F can severely damage trees.

In August 2024, Los Angeles Co Ag Comm submitted to CDFA a symptomatic mango inflorescence (*Mangifera indica*) from a tropical fruit tree nursery.

CDFA Senior diagnostician Suzanne Rooney-Latham isolated *Fusarium* from the symptomatic tissues and identified *Fusarium mangiferae* by sequencing two DNA regions.

This was the first detection of *Fusarium mangiferae,* which causes mango malformation disease, in California.

Photo: T. Miller, LA Co. Plant Pathologist

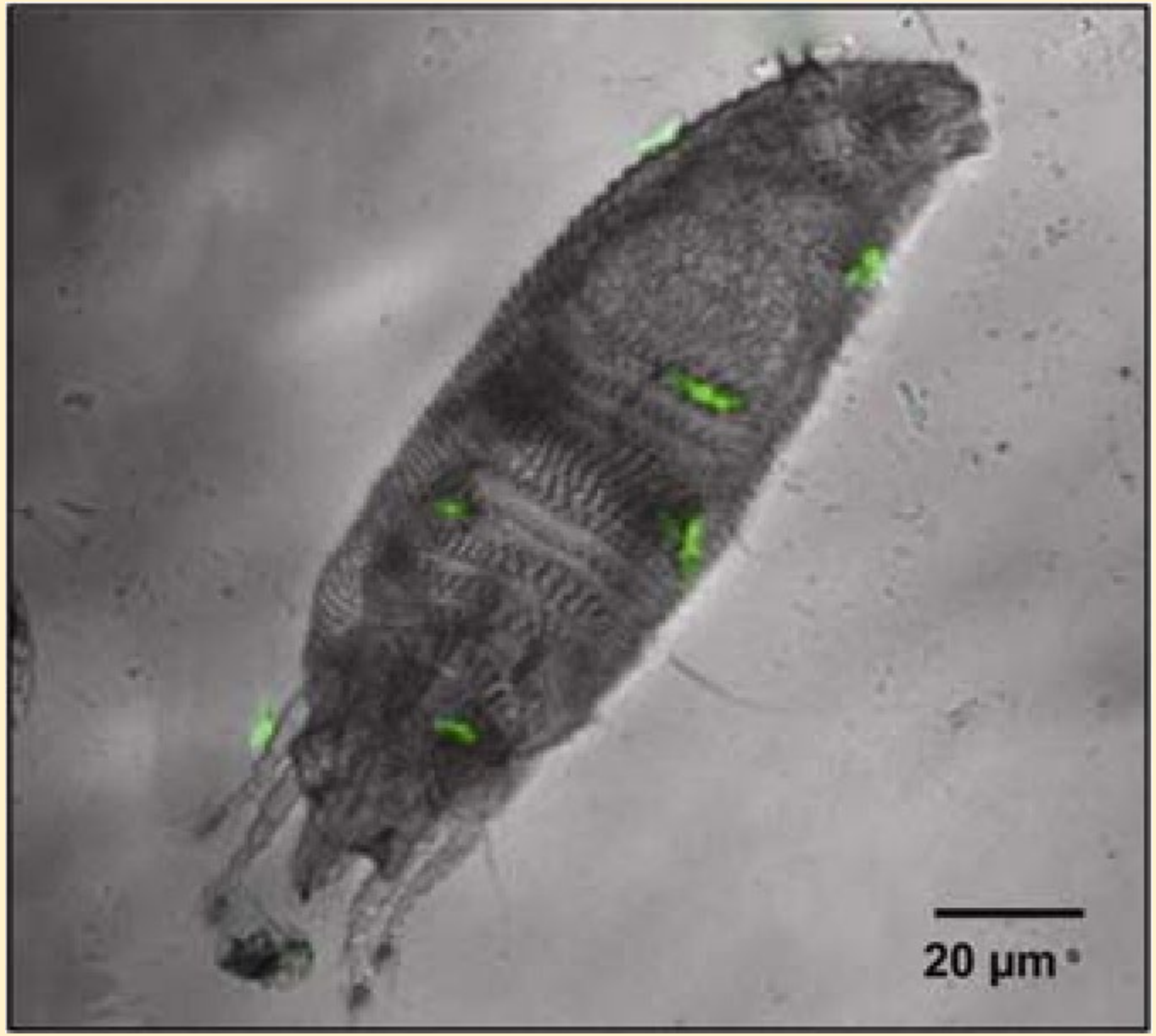
Mango Malformation Disease

MMD is one of the most important diseases affecting mangos worldwide

When it affects the flowers, it can cause a drastic reduction in the number of fruits produced, resulting in severe economic losses.

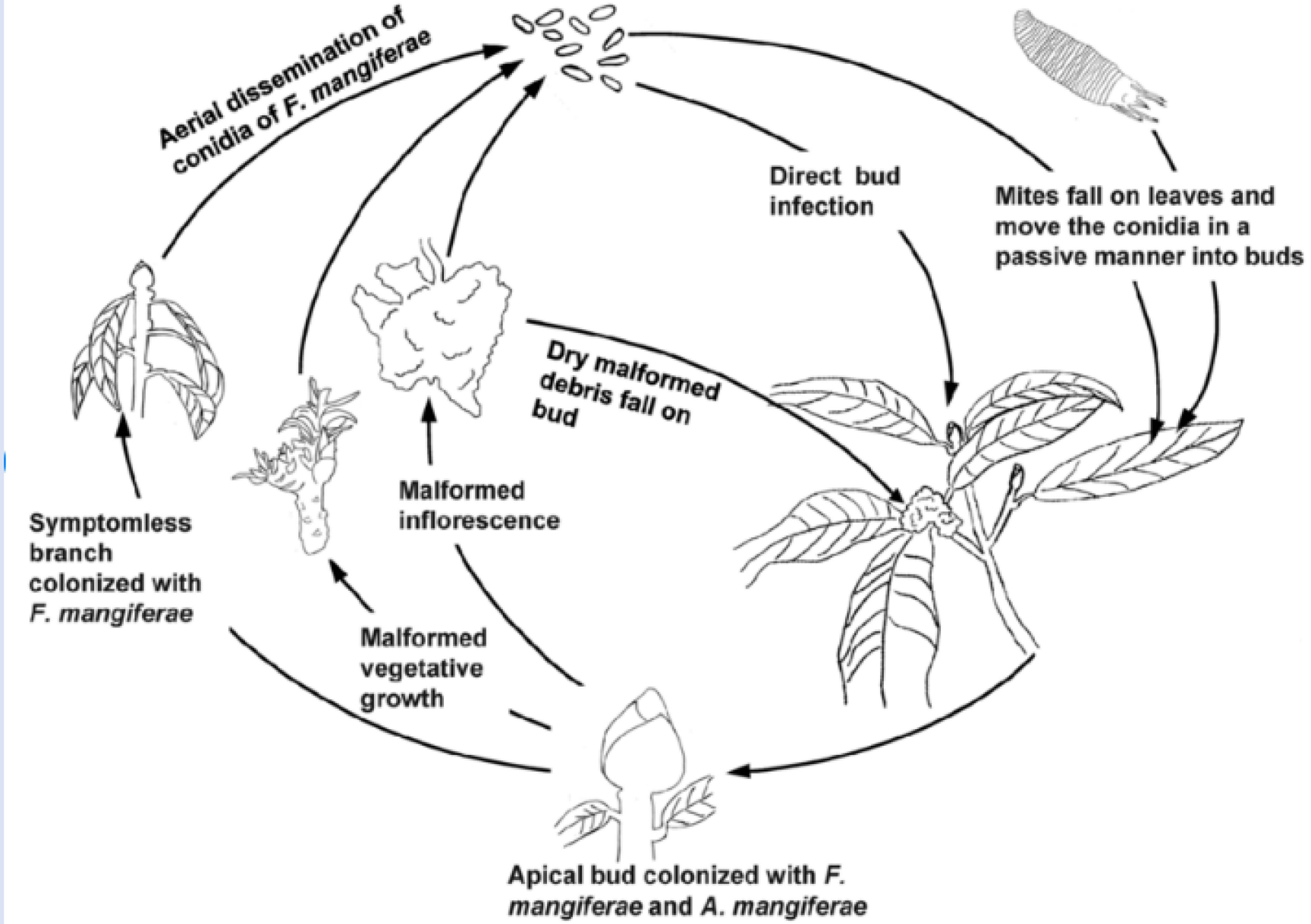
Spreads via infected nursery stock, then slowly within orchards with aerial conidia

industry.mangoes.net.au



Stanley Freeman - Agricultural Research Organization ARO

The mango bud mite *Aceria mangiferae* has been associated with MMD – no CA records (present in Florida)

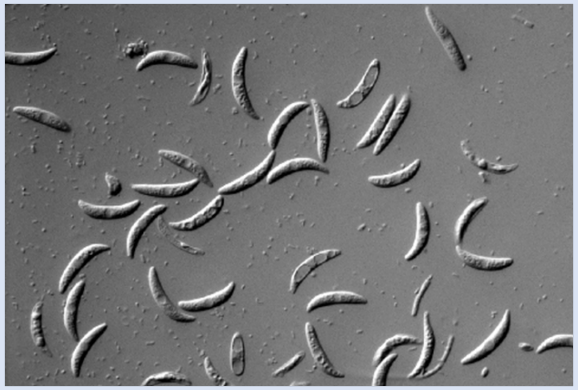


Cycle of mango malformation disease caused by the pathogen Fusarium mangiferae (A. mangiferae = Aceria mangiferae). Modified from Gamliel-Atinsky et al. (22).

The disease is especially damaging to young plants, which become severely stunted

Affected flower stems may produce 3-4x the normal number of flowers, esp. male flowers. Flowers are enlarged, sterile, and do not produce fruit

Government of Queensland



- Dry, malformed inflorescence debris drop onto the orchard floor serving as a source of inoculum.

- Both micro- and macroconidia are produced by this species, but chlamydospores are absent and no teleomorph has been described.

- No systemic infection, only local colonization of the bud tissues.

- When infected buds open, malformed vegetative and inflorescences are produced that are covered with the fungus.

agrihunt.com

- Please take samples of any suspect mangos (nursery, residence or orchard) and send to the CDFA lab.

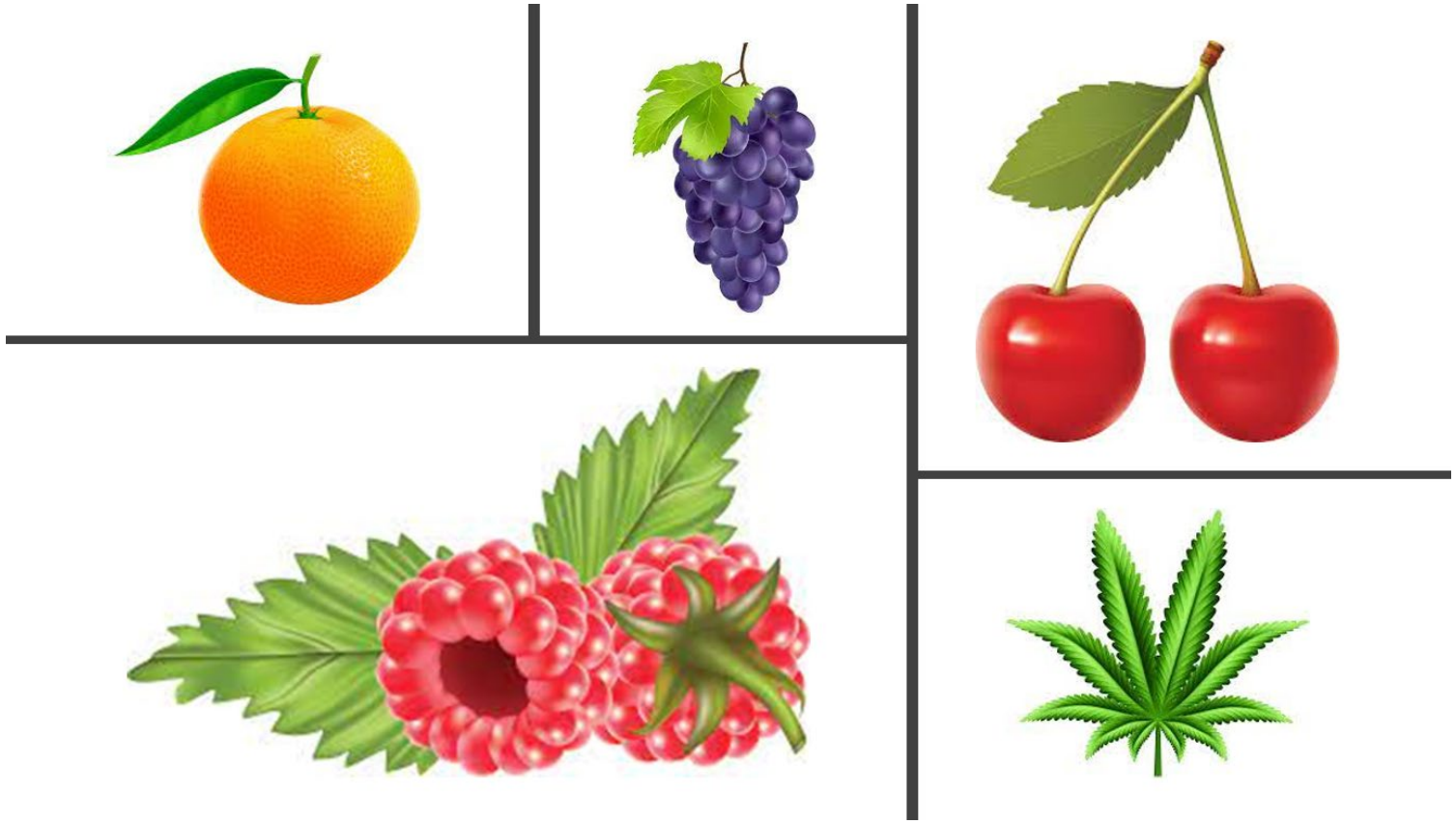
- Collect the entire inflorescence, not just brown flowers

- There are other species of *Fusarium* in Mexico that cause similar symptoms

- *F. mangiferae has a* B-rating, subject to eradication in nurseries

ECOPERS

Environmental
Compliance
Permits and
Regulation**s**



Permits@cdfa.ca.gov