CALIFORNIA OAK MORTALITY TASK FORCE REPORT
JUNE 2019

NURSERIES

The U.S. Animal and Plant Health Inspection Service (APHIS) has confirmed that 15 rhododendron plants found in Indiana nurseries have tested positive for *Phytophthora ramorum*. These rhododendron plants were part of a larger shipment that originated from one nursery in Washington and two in Canada. The shipment was sent to Oklahoma for distribution to 18 other states.

Agriculture officials in the 18 states are currently visiting nursery locations to sample the plants received from the three originating nurseries. Plants that test positive for *P. ramorum* will be destroyed along with all plants that are within a 2 meter radius of an infected plant. Host plants outside the 2 meter radius will be sampled intensively. Other hosts in the impacted facilities will be monitored for symptoms of the pathogen. A plant recall campaign has been issued in Indiana.

REGULATIONS

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) updated U.S. domestic regulations for *Phytophthora ramorum*. From 2004 to 2013, APHIS issued a series of Federal Orders to deregulate nurseries where the pathogen has never been found or had not been found recently. According to APHIS, these orders relieved regulatory burdens on states and industries where *P. ramorum* is not present in the environment and on nurseries free of the pathogen. The orders also placed nurseries with recent detections under greater restriction and federal oversight. The current quarantine revision codifies the Federal Orders with a final rule. APHIS collected and responded to public comments on this rule in 2018. APHIS has determined that updating the domestic regulations to include all Federal Orders issued in recent years will make it easier to find and comply with current restrictions necessary to protect the U.S. from the artificial spread of *P. ramorum*. This action went into effect May 20, 2019. For more information, see https://www.federalregister.gov/documents/2019/04/18/2019-07798/phytophthora-ramorum-regulated-areas-regulated-establishments-and-testing-protocols.

The Canadian Food Inspection Agency (CFIA) is changing how it responds when ***P. ramorum*** is detected at a nursery. CFIA stated that the "Response activities will be more targeted and will decrease the impact of a detection on an affected nursery. These changes align more closely with current U.S. survey and eradication methods." The revised response protocol, "PI-010: Regulatory response protocol for nurseries confirmed with *Phytophthora ramorum*" (replacing PI-010 and PI-011) is being issued for immediate implementation at the start of the 2019 plant health survey season. For more information on Canada's *P. ramorum* regulatory program see CFIA, Sudden oak death - *Phytophthora ramorum*.

RESEARCH – FOCUS ON *P. RAMORUM* IN SCOTLAND

This capsule summary of P. ramorum *on larch in Scotland is courtesy of Heather Dun, Department of Plant Sciences, University of Oxford, UK and Centre for Ecology, Society and Biosecurity, UK Forest Research, Northern Research Station. Dun is a PhD student working with John Mackay, Oxford University and Sarah Green, UK Forest Research.*

Larch is the third most important forestry species in the UK with European larch (*Larix decidua*), Japanese larch (*Larix kaempferi*), and hybrids between the two species accounting for 66,000 ha (163,000 ac) of commercial forest in Scotland. In 2009, the EU1 lineage of *P. ramorum* was found infecting and killing large numbers of Japanese larch in southwestern England. In the following year, infection was reported throughout the western side of the UK. In 2013, the Galloway Forest in southwestern Scotland suffered an extensive epidemic from a highly virulent new lineage, EU2 (Figs. 1 and 2). By the end of 2013, the epidemic covered an estimated 5,000-6,000 ha (roughly 13,590 ac) of planted larch. The Galloway Forest was declared a Management Zone to coordinate felling and other legal restrictions. Field observations between 2016 and 2019 covered a second period of increased spread in spring 2018, during which an additional ~1500 ha (3,700 ac) of larch were scheduled for felling due to *P. ramorum* outbreaks.

Figures 1 and 2. Widespread mortality and crown decline in mature Japanese larch in the Galloway Forest after the 2013 outbreak. Photos: S. Green and S. Frankel.

There were similarities in disease expansion in the 2013 and 2018 outbreaks but a lull in infection in the intervening years. Comparing field observations with climate records allowed for consideration of the possible links between climatic conditions and epidemic spread of *P. ramorum*. Retrospective analysis showed that wet summer conditions preceded each outbreak. Both 2012 and 2017 had higher than average precipitation between June and September; in particular, June had double the expected rainfall. In comparison, the years between outbreaks had drier than average summers. It is likely that high summer rainfall provides humidity for heavy sporulation, leading to new infections that become apparent in mortality during needle flush the following spring. Infections were observed to start either in the fine twigs at the end of branches or as girdling lesions on the main stem. There was variation in tree mortality from rapid deterioration with first infection, to mortality occurring within six months, to slow decline over multiple years. Felling infected stands to control spread is obligatory, but the area to be felled exceeds capacity and felling is not immediate. New outbreaks continue to occur.

It is unlikely that *P. ramorum* in Scotland will be contained, so it will likely continue to spread. Since 2013, and increasingly since 2018, *P. ramorum* has been found outside the border of the Galloway management zone and spreading north along the west coast of Scotland. Occasional outbreaks have also been found in larch on the drier east coast but these have been quickly felled and contained. It is possible that the drier conditions may be less conducive to sporulation and

epidemic spread will be less likely. Larch is planted on the west coast due to its ability to grow in areas with high rainfall, conditions that also favor *P. ramorum*. Loss of larch would leave Sitka spruce (*Picea sitchensis*) as the only commercially viable species for wet upland sites with acid soil. A Sitka spruce monoculture would raise other issues for biodiversity, disease spread, risk management and landscape aesthetics. A few trees within high mortality stands remain healthy and researchers are investigating these for possible resistance or tolerance of *P. ramorum*. Resistant trees could then be utilized in a breeding program to retain larch as a forestry option in the UK.

MANAGEMENT - CALIFORNIA

Ongoing adaptive management efforts for sudden oak death at Lacks Creek. The sudden oak death (SOD, *P. ramorum*) infestation in the Redwood Valley area of north-central Humboldt County has been, and continues to be, the focus of the most intensive SOD management effort in California. This area lies about 14-16 air miles inland from the coast, east of the town of Trinidad. The original infestation in Redwood Valley, thought to be the result of an introduction of infected ornamental plants, was discovered in 2010 and at the time was geographically isolated from any other infestations. An initial SOD suppression effort, spearheaded by University of California Cooperative Extension, Humboldt County, (UCCE) included over 400 acres of tanoak and California bay laurel removal centered on the infested zone. However, in 2012, another infested location was found in the Bureau of Land Management (BLM) Lacks Creek Management Area, situated over a mile east of the treatment area— likely initiated from a single longer distance dispersal event from Redwood Valley. This satellite infestation was coupled with continued development of SOD adjacent to the original treatment—particularly to the east—likely from individuals that already had cryptic infections at the time of treatment. Adaptation of the management strategy was thus prompted toward the use of silvicultural treatments at the leading edge of eastern side of the infestation and beyond it, to prepare against the imminent arrival of the pathogen by creating conditions in which *P. ramorum* may be less likely to establish and/or move rapidly. To date, the BLM has contracted about 300 acres, and UCCE about 210 acres, of treatment in the Lacks Creek Management Area, to be completed June 2019. More photos and treatment details are available here.

A SOD infestation was detected in this area in 2017. Conditions, pre-treatment (left), and post-mastication thinning treatment (right) are shown. Prior to treatment, the area had an abundance of California bay laurel.

Summary and photos provided by Brendan Twieg, University of California Cooperative Extension, Humboldt and Del Norte Counties.

NURSERIES

California Department of Food and Agriculture *P. ramorum* program update: Spring federal *P. ramorum* regulation compliance inspections were completed with two positive plants detected at interstate shipping nurseries. The detections arose during April inspections of six California nurseries that were previously positive for *P. ramorum* and ship host material interstate. Two of the nurseries sampled had positive plants: *Arbutus unedo* (strawberry tree) and *Viburnum* sp. 'T. Robustum'. One additional interstate shipping nursery was found positive for *P. ramorum* during an April 2019 traceback inspection of *Loropetalum chinense*. The addition of this nursery brings the 2019 total to 10 interstate shippers positive for *P. ramorum*, including two in non-quarantine counties. Six retail nurseries also tested positive for *P. ramorum* since April. All of the positive nurseries in California are undergoing or have completed the USDA APHIS Official Regulatory Protocol for Nurseries Containing Plants Infected with *Phytophthora ramorum*. For more information contact, Carolyn Lambert, Carolyn.Lambert@cdfa.ca.gov.

Oregon Department of Agriculture (ODA) *P. ramorum* program update: The ODA currently has eleven nurseries enrolled in its program: six are interstate shippers, regulated at the federal level, and five intrastate shippers are regulated under state rules. The 2019 compliance inspections began toward the end of March, and as of May 13th nine nurseries have been surveyed. Two plants, *Camellia japonica* 'Nuccio's pearl' and *Camellia japonica* 'April Tryst' were confirmed as *P. ramorum* positive. The plants were from a nursery in Marion County, an intrastate shipper. The USDA Confirmed Nursery Protocol (CNP) has been completed at the nursery. Soil taken from underneath both the positive plants was found to be infested with *P. ramorum*. The grower opted to destroy all plants within the destruction and quarantine zones by burning directly on top of the infested location. The infested plants are in an area adjacent to a repeat positive site. Soil from the area has been repeatedly tested, and a steaming treatment has been applied in previous years. A nearby pond has also been baited and found to be *P. ramorum* free. ODA staff will return to the site to re-test the soil. This area of the property has been found positive multiple times. For the second time, the grower has agreed to pile on more gravel and leave the area fallow going forward.

Image A: View of the destruction zone (inner tape) and quarantine zone (outer tape). Image B: Edge view of

second delimitation zone. Plants on the far right were not destroyed, as they were outside the quarantine zone. Photos: M. Lujan, ODA.

Of the remaining nurseries surveyed to date, seven are negative and one is pending results. Surveys are expected to be completed by early June. In April 2019, one nursery in Washington County successfully fulfilled the Certification Program requirements and has since been released. To be released, a nursery must be surveyed biannually by the State and test negative for *P. ramorum* for three consecutive years. To date, this is the second nursery to have completed the program. For more information, contact Chris Benemann, sbenemann@oda.state.or.us.

Washington Department of Agriculture *P. ramorum* program update. In April, a two-day survey was conducted at the botanical garden in Kitsap County where *P. ramorum* was first detected in 2015. Host plants were extensively sampled, with 292 samples collected near previous positive sites and around the garden perimeter. All samples were negative for *P. ramorum*. In May, a water-bait from a pond in the botanical garden was confirmed positive for *P. ramorum*. The pond is located below previously positive sites and flows out less than a quarter-mile to Puget Sound. Several water-bait positives have been detected from the pond since June 2018. Treatment options are currently being determined. For more information, contact Scott Brooks, SBrooks@agr.wa.gov.

LEGISLATION - OREGON

HB 2365, "Relating to Sudden Oak Death; and declaring an emergency" has been introduced in the Oregon State Legislature. The bill would declare a sudden oak death emergency and appropriate $1.7 million to the Oregon Forestry Department for the 2019-2021 biennium to carry out a pest management program to combat sudden oak death. For the complete bill text and more information, see https://olis.leg.state.or.us/liz/2019R1/Measures/Overview/HB2365.

MONITORING - OREGON

Recently, Oregon's SOD Program has begun a new collaboration with the U.S. Forest Service (USFS) Geospatial Technology and Application Center to map the spread and intensification of SOD utilizing multi-temporal, high-resolution, multi-spectral satellite imagery. Since 2012, the Oregon Department of Forestry and the USFS have annually acquired high resolution (30 cm), 4-band multi-spectral, digital, airborne imagery to quantify and monitor disease spread and intensification. Current SOD surveillance methods rely on photointerpretation and manual delineation to assess pathogen distribution; however, these techniques are inefficient and not exhaustive. This project will investigate Structure from Motion (SfM) workflows for characterizing canopy structure information and detection of changes in canopy morphology. In addition, field data will be used in conjunction with the high-resolution imagery to evaluate classification methods. These workflows have the potential to greatly improve SOD monitoring methods and enhance land managers' decision-making capability. For more information, contact Sarah Navarro, Sarah.Navarro@oregon.gov.

RESEARCH

Aglietti, C.; Luchi, N.; Pepori, A.L.; Bartolini, P.; Pecori, F.; Raio, A.; Capretti, P. and Santini, A. 2019. Real-time loop-mediated isothermal amplification: an early-warning tool for

quarantine plant pathogen detection. AMB Express. 9(1): 50. doi.org/10.1186/s13568-019-0774-9.

An effective framework for early warning and rapid response is a crucial element to prevent or mitigate the impact of biological invasions of plant pathogens, especially at ports of entry. Molecular detection of pathogens by using PCR-based methods usually requires a well-equipped laboratory. Rapid detection tools that can be applied as point-of-care diagnostics are highly desirable, especially to intercept quarantine plant pathogens such as *Xylella fastidiosa*, *Ceratocystis platani* and *Phytophthora ramorum*, three of the most devastating pathogens of trees and ornamental plants in Europe and North America. To this aim, in this study we developed three different loop mediated isothermal amplification (LAMP) assays able to detect each target pathogen both in DNA extracted from axenic culture and in infected plant tissues. By using the portable instrument Genie® II, the LAMP assay was able to recognize *X. fastidiosa*, *C. platani* and *P. ramorum* DNA within 30 min of isothermal amplification reaction, with high levels of specificity and sensitivity (up to 0.02 pg μL^{-1} of DNA). These new LAMP-based tools, allowing an on-site rapid detection of pathogens, are especially suited for being used at ports of entry, but they can be also profitably used to monitor and prevent the possible spread of invasive pathogens in natural ecosystems.

Aram, K. and Rizzo, D.M. 2019. *Phytophthora ramorum* and *Phytophthora gonapodyides* differently colonize and contribute to the decomposition of green and senesced *Umbellularia californica* leaves in a simulated stream environment. Forests. 10(5): 434.

Plant pathogenic as well as saprotrophic *Phytophthora* species are now known to inhabit forest streams and other surface waters. How they survive and function in aquatic ecosystems, however, remains largely uninvestigated. *Phytophthora ramorum*, an invasive pathogen in California forests, regularly occurs in forest streams, where it can colonize green leaves shed in the stream but is quickly and largely succeeded by saprotrophically competent clade 6 *Phytophthora* species, such as *Phytophthora gonapodyides*. We investigated, using controlled environment experiments, whether leaf litter quality, based on senescence, affects how *P. ramorum* and *P. gonapodyides* compete in leaf colonization and to what extent each species can contribute to leaf decomposition. We found that both *Phytophthora* species effectively colonized and persisted on green or yellow (senescing) bay leaves, but only *P. gonapodyides* could also colonize and persist on brown (fully senesced and dried) leaves. Both *Phytophthora* species similarly accelerated the decomposition of green leaves and yellow leaves compared with non-inoculated controls, but colonization of brown leaves by *P. gonapodyides* did not affect their decomposition rate.

Dillon, W.W. and Meentemeyer, R.K. 2019. Direct and indirect effects of forest microclimate on pathogen spillover. Ecology. e02686.

Disease dynamics are governed by variation of individuals, species, and environmental conditions across space and time. In some cases, an alternate reservoir host amplifies pathogen loads and drives disease transmission to less competent hosts in a process called pathogen spillover. Spillover is frequently associated with multi-host disease systems where a single species is more tolerant of infection and more competent in pathogen transmission compared to

other hosts. Pathogen spillover must be driven by biotic factors, including host and community characteristics, yet biotic factors interact with the abiotic environment (e.g. temperature) to create disease. Despite its fundamental role in disease dynamics the influence of the abiotic environment on pathogen spillover has seldom been examined. Improving our understanding of disease processes such as pathogen spillover hinges on disentangling the effects of interrelated biotic and abiotic factors over space and time. We applied 10 years of fine-scale microclimate, disease, and tree community data in a path analysis to investigate the relative influence of biotic and abiotic factors on pathogen spillover for the emerging infectious forest disease sudden oak death (SOD). Disease transmission in SOD is primarily driven by the reservoir host California bay laurel, which supports high foliar pathogen loads that spillover onto neighboring oak trees and create lethal canker infections. The foliar pathogen load and susceptibility of oaks is expected to be sensitive to forest microclimate conditions. We found that biotic factors of pathogen load and tree diversity had relatively stronger effects on pathogen spillover compared to abiotic microclimate factors, with pathogen load increasing oak infection and tree diversity reducing oak infection. Abiotic factors still had significant effects, with greater heat exposure during summer months reducing pathogen loads and optimal pathogen conditions during the wet season increasing oak infection. Our results offer clues to possible disease dynamics under future climate change where hotter and drier or warmer and wetter conditions could have opposing effects on pathogen spillover in the SOD system. Disentangling direct and indirect effects of biotic and abiotic factors affecting disease processes can provide key insights into disease dynamics including potential avenues for reducing disease spread and predicting future epidemics.

Feau, N.; Ojeda, D.I.; Beauseigle, S.; Bilodeau, G.J. and others. 2019. Improved detection and identification of the sudden oak death pathogen *Phytophthora ramorum* and the Port Orford cedar root pathogen *Phytophthora lateralis.* Plant Pathology. Early view. Doi: 10.1111/ppa.13015

Early detection provides the best way to prevent introduction and establishment of alien plant pathogens. Amplification of DNA by PCR has revolutionized the detection and monitoring of plant pathogens. Most of those assays rely on the amplification of a fraction of the genome of the targeted species. With the availability of whole genomes for a growing number of fungi and oomycetes it is becoming possible to compare genomes and discover regions that are unique to a target organism. This study has applied this pipeline to develop a set of hierarchical TaqMan real-time PCR detection assays targeting DNA of all four *Phytophthora ramorum* lineages, and a closely related species, *P. lateralis.* Nine assays were generated: three targeting DNA of all *P. ramorum* lineages, one for each lineage of *P. ramorum*, one for *P. lateralis* and one targeting DNA of *P. ramorum* and *P. lateralis*. These assays were very accurate and sensitive, ranging from 98.7% to 100% detection accuracy of 2–10 gene copies of the targeted taxa from pure cultures or inoculated tissues. This level of sensitivity is within the lowest theoretical limit of detection of DNA. It is expected that these assays will be useful because of their high level of specificity and the ease with which they can be multiplexed because of the inherent flexibility in primer and probe design afforded by their lack of conservation in non-target species.

Gaydos, D.A.; Petrasova, A.; Cobb, R.C. and Meentemeyer, R.K. 2019. Forecasting and control of emerging infectious forest disease through participatory modelling. Philosophical Transactions R. Soc. B. 374: 20180283. http://dx.doi.org/10.1098/rstb.2018.0283.

Epidemiological models are powerful tools for evaluating scenarios and visualizing patterns of disease spread, especially when comparing intervention strategies. However, the technical skill required to synthesize and operate computational models frequently renders them beyond the command of the stakeholders who are most impacted by the results. Participatory modelling (PM) strives to restructure the power relationship between modellers and the stakeholders who rely on model insights by involving these stakeholders directly in model development and application; yet, a systematic literature review indicates little adoption of these techniques in epidemiology, especially plant epidemiology. We investigate the potential for PM to integrate stakeholder and researcher knowledge, using *Phytophthora ramorum* and the resulting sudden oak death disease as a case study. Recent introduction of a novel strain (European 1 or EU1) in southwestern Oregon has prompted significant concern and presents an opportunity for coordinated management to minimize regional pathogen impacts. Using a PM framework, we worked with local stakeholders to develop an interactive forecasting tool for evaluating landscape-scale control strategies. We find that model co-development has great potential to empower stakeholders in the design, development and application of epidemiological models for disease control. [This article is part of a focus issue, 'Modelling infectious disease outbreaks in humans, animals and plants: epidemic forecasting and control'.]

Ruffner, B.; Rigling, D. and Schoebel, C.N. 2019. Multispecies *Phytophthora* disease patterns in declining beech stands. Forest Pathology. e12514.

Decline diseases are typically caused by complex abiotic and biotic interactions and characterized by a suite of symptoms indicative of low plant vigour. Diseased trees are frequently infected by *Phytophthora*, but the complex interactions between pathogen, host and the heterogeneous forest environment mask a comprehensive understanding of the aetiology. In the present study, we surveyed European beech (*Fagus sylvatica*) stands in Swiss forests with recent increases in bleeding lesions for the presence of *Phytophthora*. We used a combined approach of analysing soil and bark samples from trees displaying bleeding lesions and trees free from bleeding lesions. Soil baiting revealed a higher prevalence of *Phytophthora* spp. around trees with bleeding lesions than around trees without bleeding lesions. For the bark samples from bleeding lesions, we used several detection methods. *Phytophthora* spp. were detected in 74% of the trees by an immunological on-site diagnostic kit, in 64% by a specific PCR assay, and 38% by isolation on selective media. All samples tested were negative for *P. ramorum* using qPCR. Overall, nine *Phytophthora* species were identified by ITS sequencing, the most common of which were *P. plurivora*, *P. gonapodyides*, *P.* × *cambivora* and *P. syringae*. We identified distinct species in bleeding lesions and the rhizosphere of the same host tree which suggests a multispecies *Phytophthora* disease patterns in these declining beech. Among the recovered species, *P.* × *cambivora* and *P.* × *serendipita* were identified as hybrid genotypes with the former abundant in bleeding lesions.

Tooley, P.W. and Browning, M. 2019. The effect of leaf wetness on *Phytophthora ramorum* zoospore infection of *Rhododendron* 'Cunningham's White'and *Viburnum tinus*. Plant Disease. Early View. doi.org/10.1094/PDIS-09-18-1681-RE.

We performed studies using zoospore inoculum combined from nine isolates of *Phytophthora ramorum* and determined the effect of leaf wetness on infection of whole plants of

Rhododendron 'Cunningham's White' and *Viburnum tinus*. The mean percentage of infected leaves for both host species increased gradually across a dew chamber moisture period of 1 to 6 h, reaching approximately 80% infection by 6 h. We also evaluated the effect of a postinoculation drying period on infectivity of the two host species with zoospore inoculum. With a 30-min postinoculation drying period, *Rhododendron* 'Cunningham's White' sustained less than 40% infected leaves, whereas *V. tinus* had an infection rate of almost 75% infected leaves. Disease percentages for both host species declined sharply with drying periods longer than 30 min. Knowledge of infectivity parameters for *P. ramorum* will provide a better understanding of epidemic development and lead to improved recommendations for control.

RELATED RESEARCH

McGowan, J.; O'Connor, E.; O'Hanlon, R.; Owens, R.A. and Fitzpatrick, D.A. 2019. Proteomic analysis of three ubiquitous *Phytophthora* species threatening global forest ecosystems. Access Microbiology. 1: doi: 10.1099/acmi.ac2019.po0550.

Scott, P.; Taylor, P.; Gardner, J.; Puértolas, A.; Panda, P.; Addison, S.; Hood, I.; Burgess, T.; Horner, I.; Williams, N.; McDougal. R. 2019. *Phytophthora aleatoria* sp. nov., associated with root and collar damage on *Pinus radiata* from nurseries and plantations. Australasian Plant Pathology. 1-9. doi.org/10.1007/s13313-019-00631-5.

Socorro, M.S.; Osmundson, T.; Almaraz-Sanchez, A.; Croucher, P.J.; Swiecki, T.; Alvarado, D. and Garbelotto, M. 2019. A microsatellite analysis identifies global pathways of movement of *Phytophthora cinnamomi* and the likely sources of wildland infestations in California and Mexico. Phytopathology. First Look. https://doi.org/10.1094/PHYTO-03-19-0102-R.

MEETINGS

There's still time to register for the Sudden Oak Death Seventh Science and Management Symposium, "Healthy Plants in a World with *Phytophthora*" (SOD7) to be held June 25- 27, 2019 in the Presidio, San Francisco. Abstracts have been posted for the 50 talks and posters to feature research and management of *P. ramorum* and other *Phytophthora* species. For more information, see https://ucanr.edu/sites/sod7/.

The 2019 California Forest Pest Council Insect and Disease Field Tour, **intended for land** managers, ecologists, vegetation managers, and the general public, will take place in the Fort Bragg area (Mendocino Co.) on Tuesday, July 16, 2019. The tour will visit a variety of forest pest issues on both private and public lands, including sudden oak death, bear damage, balsam woolly adelgid on grand fir, bishop pine decline, and *Phytophthora cinnamomi* damage. More information will be forthcoming at www.caforestpestcouncil.org.

CALENDAR OF EVENTS

June 25 – 27, 2019. Sudden Oak Death Seventh Science and Management Symposium.
The Presidio, San Francisco. For more information, see https://ucanr.edu/sites/sod7/.

July 16, 2019. California Forest Pest Council Insect and Disease Field Tour - 2019, Fort Bragg. For more information, see Meetings section above or contact Chris Lee, christopher.lee@fire.ca.gov.

November 13 -14, 2019. California Forest Pest Council 2019 Annual Meeting, UC Davis. Save the date. Further information will be available in a few months.