# Diagnostic Services and Account Set-up Procedures

**TriCal Diagnostics** is a team of highly experienced diagnosticians with extensive knowledge of plant pathology and nematology, microbiological and molecular identification techniques, research methodologies, soilborne pathogen and nematode detection methods, and production agriculture and horticulture. The first step in managing plant diseases is identifying the cause of such problems. Therefore, disease and nematode management relies on careful diagnosis. We offer disease and plant problem identification services to growers, field personnel, pest control advisors, general public, and others throughout California and the US. We value service to the customer, provide accurate and timely diagnoses.

**Dr. Hanane Stanghellini, Director**

Dr. Hanane Stanghellini has an extensive background in custom diagnostics, spanning over 28 years of research and private-sector expertise, including plant pathogens, functional genomics of nematodes, and disease resistance screening for vegetables and leafy greens. She received her Ph.D. from Rheinische Friedrich-Wilhelm's-Universität Bonn Germany, where she studied rhizosphere-specific microbial communities. She furthered her research through two postdoctoral appointments at North Carolina State University: one investigating soil amendments and their impact on microbial structures, and the second in Nematology, focusing on the molecular and functional genomic analysis of soybean cyst nematode parasitism. From 2007 through 2017, she was the lead diagnostician at a commercial plant pathology laboratory that primarily served the leafy green and vineyard industries. Before becoming Lab Director at TriCal Diagnostics in 2026, Hanane served as Lab Manager**.**

**Dr. Mahnaz Rashidi, Molecular Specialist**

Dr. Mahnaz Rashidi received her Ph. D. in Plant Pathology from University of Turin, Italy. She has broad experience in the study of biology and molecular biology of host-pathogen-vector interactions. She has a strong background in pathogen molecular diagnostics, the epidemiology of bacterial, phytoplasma, and viral pathogens and their vectors of different crops, and screening for disease resistance.

**Dr. Kristi Sanchez, Nematologist and Research Director at TriCal Inc.**

Nematologist at TriCal Diagnostics, Dr. Kristi Sanchez received her Ph. D. in Plant Pathology, specializing in Nematology, from the University of California, Davis. She has over a decade of combined research and field experience while working at UC Davis, the agricultural industry, and the Plant Pest Diagnostics Center with the California Department of Food and Agriculture. Kristi's research background includes pest management of nematodes, morphological and molecular diagnostics of plant parasitic nematodes, and the development of experimental assays for nematode studies in the lab and field. With TriCal Diagnostics Kristi focuses on nematode assessments (sampling, detection, identification, quantification) and field research.

**Hannah Zima, Assistant Lab Manager**

Hannah Zima received a M.S. in Plant Pathology from the University of Arkansas, where she researched plant-disease interactions on various hosts such as cannabis and spinach. Also, she has been involved with diagnostics including field trials for diseases on leafy greens, and is proficient in traditional as well as molecular lab techniques

**Jennifer Guerrero, Lab Technician**

Jennifer Guerrero received her B. S. degree in Chemistry with a minor in Environmental Science from UC Merced, where she also worked as a research assistant in a Soil Biogeochemistry Lab exploring how physical disturbances in the environment affect soil organic matter dynamics. She was a lab technician at an analytical lab for 5 years where she was responsible for sample preparation and analysis, data recording, and report writing. She is proficient with various analytical instruments and is experienced with developing SOPs and related documentation.

**Miguel Martinez, Lab Technician**

Miguel Martinez received his B. S. in Agricultural Plant & Soil Sciences from CSU Monterey Bay. Miguel has experience with various molecular techniques used for plant disease diagnostics. While working with the U.S. Department of Agriculture, he focused on viruses affecting cucurbits and lettuce.

**Lilly Cosio, Administrative Assistant**

Lilly was born and raised in the outskirts of Watsonville and grew up surrounded by apple orchards. Lilly's father worked for a locally owned apple company where Lilly would help him with organizing and completing paperwork. As TCD's Administrative Assistant, she oversees front desk reception duties, manages package delivery and arrival, helps organize the office, and assists TCD with lab sample tracking, data entry, client reports, and invoicing.

**2026**

# Diagnostic Services: Plant Materials

- **Custom diagnostics and problem-solving for plant samples:**
  - Plant samples are analyzed and tested using microbiological culturing methods, examination with microscopes, lab incubations, serology (ELISA and other tools), and other techniques. Pathogens and other crop issues (insect/mite, nutritional, genetic, abiotic) are identified.
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- **Molecular diagnostics of plant samples:**
  - We use molecular methods including conventional PCR (polymerase chain reaction), qPCR (quantitative PCR), and RPA (recombinase polymerase amplification).
  - Examples of assays include:
    - RPA to identify *Verticillium dahliae, Macrophomina phaseolina* (strawberry strain), *Fusarium oxysporum* f. sp. *fragariae* (strawberry) and *Phytophthora*
    - RPA to identify Fusarium and Verticillium wilt pathogens of lettuce
    - qPCR screening of grape powdery mildew for QoI (Strobilurin) resistance
    - PCR race identification of *Fusarium oxysporum* f. sp. *apii* from celery
    - PCR race identification of *Verticillium dahliae*
    - qPCR to detect the tomato canker pathogen (*Clavibacter*)
    - qPCR/RT-PCR detection of viruses
    - Sequence-based identification of pathogens

***Contact us for pricing and other information.***

# Diagnostic Services: Soil and Water

- **Single soilborne strawberry pathogen qPCR assay:**
  - We use this rapid DNA-based method to detect single pathogens in soil: *Verticillium dahliae* or *Macrophomina phaseolina* (strawberry strain) or *Fusarium oxysporum* f. sp. *fragariae* (strawberry strain). Test results measure how much *Verticillium* or *Macrophomina* is present (quantitative) or will indicate if the strawberry *Fusarium* pathogen is present (yes/no: qualitative only).

- **Comprehensive qPCR package for 3 major soilborne strawberry pathogens:**
  - We also offer discounted prices if using this qPCR method to detect all three pathogens: *Verticillium dahliae, Macrophomina phaseolina* (strawberry strain), and *Fusarium oxysporum* f. sp. *fragariae* (strawberry) in soil. Test results measure how much *Verticillium* and *Macrophomina* are present (quantitative) and will indicate if the strawberry *Fusarium* pathogen is present (yes/no: qualitative only).

- **Soil plating for *Verticillium* and/or *Macrophomina*:**
  - Agar plate test for culturable *Verticillium* and/or *Macrophomina* species. This test detects various species and provides an overall count of viable *Verticillium* and or *Macrophomina* propagules in soil. Results are available in approx. 5 to 6 weeks.

- ***Fusarium oxysporum* f. sp. *lactucae* (lettuce):**
    - Agar plate test for the lettuce Fusarium wilt pathogen, *Fusarium oxysporum* f. sp. *lactucae.* Results are available in approx. 2 to 3 weeks.

- ***Phytophthora/Pythium* test:**
    - A baiting test is used to determine if *Phytophthora/Pythium* ("water molds") are in a soil sample. This assay indicates if the potential pathogen is present (yes/no: qualitative only). For species identification of *Phytophthora/Pythium*, molecular analysis is available for an additional fee.

- **Irrigation water testing for pathogens and other microorganisms:**
    - Water can be tested for various soilborne pathogens and other microorganisms by using direct culture, filter, or bait methods.

***Contact us for pricing and other information.***

## Diagnostic Services: Nematode Identification and Quantification

- **Testing for nematodes in soil, roots, plants:**
    - Nematode extraction methods are used on soil, root, and other plant tissue samples when identification (to nematode genus) and enumeration of plant parasitic nematodes are needed. Methods include Baermann funnel, sugar flotation, and screening.

- **Nematode species identification**
    - Species identification of plant parasitic nematodes can be determined using molecular (PCR) methods. Free-living nematodes, as indicators of soil health, can also be identified and quantified.

***Contact Dr. Kristi Sanchez (ksanchez@trical.com) for pricing and other information.***

## Screening Plants for Pathogen Resistance

- **Screening lettuce for resistance/susceptibility to *Bremia lactucae* (*Bl:US* races 7-10)**
    - We offer indexing and screening services for lettuce downy mildew disease.

***Contact Dr. Hanane Stanghellini (hstanghellini@trical.com) for pricing and other information.***

## Special Projects and Research in Plant Pathology

TriCal Diagnostics is available to assist with specialized plant pathology projects:
Fungicides and biologicals efficacy testing (lab, greenhouse)
Production of pathogen inoculum for research (client must have appropriate permits).
Collaborations on projects and grants

Contact:
***Dr. Hanane Stanghellini (hstanghellini@trical.com) for pricing and other information***.

# Account Setup and Shipping Samples

**Payment details / Setting up of accounts**

An invoice will be generated when sample analyses are completed. Clients can set up accounts and will be billed monthly. To set up an account, fill out the two new account forms and send them to Hanane Stanghellini (hstanghellini@trical.com) or include them with your first submission of samples.

**Documents available from our website** (www.tricaldiagnostics.com)

- New Account application form
- Guidelines for collecting and submitting samples: plants
- Guidelines for collecting and submitting samples: soil
- Guidelines for collecting and submitting samples: nematodes
- Lettuce downy mildew indexing and screening services
- Sample submission form
- CDFA permit for samples shipped to TriCal Diagnostics from within CA.
- Federal APHIS permits for samples shipped to TriCal Diagnostics from
    - 1. Continental USA, or
    - 2. International locations

**Procedures for mailing/shipping samples to our Lab on Highway 25:**

Collect samples according to the suggested guidelines.

Fill out and include the sample submission form.

Include a copy of the appropriate regulatory permit:
State CDFA permit (if sample is from within CA)
Federal APHIS permit 1 (if sample is from outside of CA but within continental USA)

For best results send the samples by overnight/next day delivery. If the sample is particularly perishable, include ice packets in the shipping container.

Do not ship samples on a Friday or weekend (delivery will be delayed until the following week).

**Special instructions for international samples**
Do not send samples until speaking with Hanane, or Lilly.
Samples originating from outside of the USA require special labeling (red & white APHIS labels).
Federal International APHIS permit 2 must also be included with the shipment.
See our instruction page for shipping international samples to TCD.

**Mail or ship the sample (with submission form and appropriate permit) to:**

TriCal Diagnostics Lab
8770 Highway 25
Hollister, California 95023

**Note: US Post does not ship to this address; one must use FedEx, UPS, or other carrier.**

**Hand-delivered drop-off samples can be left at the following locations:**

***TriCal Diagnostics Lab***
8770 Highway 25
Hollister, California 95023
For sample drop-off, open Monday through Friday, 8:00 a.m. through 4:00 p.m. Closed weekends and holidays.

***Salinas drop-off location:***
Grower-Shipper Association (refrigerator at back of mail/copy room)
512 Pajaro Street
Salinas, California 93902
For sample drop-off, open Monday through Friday, 8:00 a.m. through 4:00 p.m. Closed weekends and holidays.

***Watsonville drop-off location:***
Perry Laboratory (831-722-7606)
424 Airport Blvd
Watsonville, California 95076
For sample drop-off, open Monday through Thursday, usually 9:00 a.m. through 5:00 p.m. Closed weekends and holidays. Call for specific hours of operation.

# Contact Information

Dr. Hanane Stanghellini (831-537-8730) [operations, accounts, billing, lettuce downy mildew] hstanghellini@trical.com

Dr. Kristi Sanchez [nematology] ksanchez@trical.com

Lilly Cosio [administrative questions, sample shipping/delivery] lcosio@trical.com