AUSTIN N. FIFE

RESEARCH STATEMENT

My main area of expertise is arthropod-plant-pathogen interactions:
I have experience with multiple insect and mite-plant-pathosystems, chemical ecology, insect/mite identification, and statistical analysis with R software.
I leverage these skills to explore how herbivores interact with the natural landscape.

EDUCATION

PhD: Entomology and Nematology - University of Florida *2 Jun 2019 - 31 Dec 2021*
Dissertation: Mite-virus-plant complexes of importance for Florida agriculture: early detection, chemical ecology and biocontrol of *Phyllocoptes fructiphilus* and *Brevipalpus californicus*
Courses: **Insect Chemical Ecology**, **Plant-Pathogen-Insect Interactions**, **Epidemiology & Data Science**, **Spatial Ecology of Insects**, Agricultural Acarology, Introduction to Acarology, Insect Classification, Introduction to Applied Statistics, Ecology of Vector-Borne Disease, Vector Biology Models, Insect Microbiology, Data Storytelling

MS: Entomology - University of Idaho *18 May 2015 - 14 Dec 2018*
Thesis: Investigating behavior of the potato psyllid *Bactericera cockerelli* (Šulc) (Hemiptera: Triozidae) on three potato genotypes with putative resistance to "*Candidatus* Liberibacter solanacearum"
Courses: **Insect-Plant Interactions**, **Advanced Insect Ecology**, **Advanced Forest Entomology**, **Host Plant Resistance**, Plant Pathology, Insect Physiology, Potato Science

BS: Biology, emph: Zoology - BYU - Idaho *19 Apr 2011 - 10 Apr 2015*
Courses: **General Botany**, **An Evolutionary Survey of Plants**, **Biostatistics**, **Biochemistry & Molecular Biology**, **Evolutionary Science**, Insect Systematics, General Entomology, Understanding DNA, Genetics and Molecular Biology, Invertebrate/Vertebrate Zoology, General Chemistry I, General Chemistry II, Ecology I, Potato Science
Readings in Hispanic Literature - Advanced Speaker

RESEARCH EXPERIENCE

Research Assistant - University of Florida *18 Jul 2018 - 31 Dec 2021*

Investigated biological control of herbivorous mites (*Phyllocoptes fructiphilus*) in three field trials by combining natural enemies (predatory mites) and inducing plant defenses (systemic acquired resistance, SAR). Discovered two previously unreported mite-plant-virus pest complexes in Florida. Monitored and mapped pest mite populations (phenology) in the field. Collected data at alternative sites after use of viral resources became restricted due to pest quarantine by the Florida Department of Agriculture and Consumer Services (FDACS). Collaborated with over 10 PIs from plant pathology and entomology departments from the University of Florida, the University of Georgia, the USDA-ARS and the FDACS. Established colonies of predatory and herbivorous mites. Presented at extension workshops and local rose club. Complied with permits and state restrictions for movement of plants, mites, and viruses. Have current pesticide applicator's permit for ornamental plants and turf in Florida. Developed novel methods to collect samples of volatiles in the field via SPME. Taught and worked with seasonal personnel to conduct experiments and maintain projects. Developed 15+ standard operating procedures (SOPs), protocols and improved methods for surveying, processing samples, preparing chemistry, and mounting mites. Followed protocols and methods for qPCR and RPA of plant viruses. Grew over 100 roses, as well as beans, tobacco, orchids, liriopogons, and etc. in a greenhouse. Analyzed changes in chemistry (volatile organic compounds), for virus-infected plants via headspace volatile collection using Solid Phase Microextraction (SPME) with paired Gas Chromatography-Mass Spectrometry. Interpreted results with R software and statistical methods, including principal component analyses (PCA), uniform manifold approximation and projection (UMAP), analysis of variance (ANOVA), Chi-squared tests and Generalized Linear Mixed Modeling (GLMMs). Participated in courses on R, Impact Network Analysis, and presented at a book club about Data Science, AI, Machine Learning, and Deep Learning with R at the University of Florida. Also attended APS workshop: "Basic bioinformatics and command-line tools for phytopathologists".

Research Assistant - University of Idaho *15 Apr 2015 - 18 Dec 2018*

Studied host plant selection of the potato psyllid *Bactericera cockerelli*, vector of Zebra Chip Disease in potato. Maintained four insect colonies, grew hundreds of plants in the greenhouse, including 10 varieties of potato, tomatoes, eggplant, weeds and various species of native plants from seed to test psyllid feeding behaviors. Used statistical methods in R to interpret results, including t-tests, ANOVA, and GLMMs. Wrote and published thesis with LaTex. Developed protocols, SOPs, and new methods to record insect behaviors and fecundity on living plants with a limited budget. Assisted in pest monitoring by processing hundreds of sticky traps weekly. Manually sorted and weighed potatoes with a small team.

Research & Teaching Assistant - BYU - Idaho *13 Apr 2013 - 15 Apr 2015*

Drove an off-road vehicle and navigated sand dunes with GPS to record, locations, habitat, characteristics, range, and dispersion of *Cicindela arenicola*, the St. Anthony Dunes Tiger Beetle. Prepared lab activities, graded papers, assisted students and curated the insect collection. Independently applied for and obtained permit from National Park Service and the Bureau of Land Management - Craters of the Moon National Monument to collect data on a threatened species, the Western Ice Cave Beetle, *Glacicavicola bathysciodes*. Spelunked in the St. Anthony Civil Defense Caves to observe populations of *G. bathysciodes*. Tutored Spanish class via conversation practice.

Publications

Journal of Integrated Pest Management *Accepted on Oct 2021*
'First report of the *Brevipalpus*-transmitted (Trombidiformes: Tenuipalpidae) *Orchid fleck dichorhavirus* infecting three ornamental in Florida'
Austin N. Fife, Daniel Carrillo, Gary Knox, Fanny Iriarte, Kishore Dey, Avijit Roy, Ronald Ochoa, Gary Bauchan, Mathews Paret, and Xavier Martini

Florida Entomologist *Sep 2020*
'First Report of *Phyllocoptes fructiphilus* Kefier (Eriophyidae), the vector of the rose rosette virus, in Florida, USA'
Austin N. Fife, Samuel Bolton, Jessica L. Griesheimer, Mathews Paret, and Xavier Martini

Journal of Insect Science *Mar 2020*
'Potato psyllid *Bactericera cockerelli* (Šulc) (Hemiptera: Triozidae) behavior on three potato genotypes with putative resistance to "*Candidatus* Liberibacter solanacearum"'
Austin N. Fife, Arash Rashed, Regina Cruzado Gutierrez, Richard Novy, and Erik J. Wenninger

Oral Presentations

Annual Meeting of the Entomological Society of America *Nov 2021*
'Management of herbivorous mites of rose with predatory mites and systemic acquired resistance'
Austin N. Fife, Gary Knox, Mathews Paret and Xavier Martini

Plant Health 2021 - The American Phytopathological Society (Online) *Aug 2021*
'New encounters with old problems: Orchid fleck dichorhavirus infecting three new ornamental hosts in Florida'
Austin N. Fife, Xavier Martini, Mathews Paret, Gary Knox, Kishore Dey, Gary R. Bauchan, and Ronald Ochoa

2021 Virtual Southeastern Branch Meeting (Online) *Mar 2021*
'*Orchid fleck dichorhavirus*: A new *Brevipalpus* transmitted virus fresh from Florida'
Austin N. Fife, Xavier Martini, Mathews Paret, Gary Knox, Kishore Dey, Gary R. Bauchan, and Ronald Ochoa

Annual Meeting of the of the Entomological Society of America (Online) *Nov 2020*
'Exploring new areas of integrated pest management for mites on roses: predatory mites and systemic acquired resistance'
Austin N. Fife, Gary Knox, Xavier Martini, and Mathews Paret

Annual Meeting of the of the Entomological Society of America, St. Louis, MO *Nov 2019*
'*Amblyseius swirskii* attraction to volatiles produced from roses infected with Rose Rosette Virus'
Austin N. Fife, Gary Knox, Xavier Martini, and Mathews Paret

Annual Meeting of the Florida Entomological Society, St. Augustine, FL *Jul 2018*
'Settling behaviors of the potato psyllid,
Bactericera cockerelli (Hemiptera: Triozidae), on different germplasms'
Austin N. Fife, Arash Rashed, Regina Cruzado Gutierrez,
Richard Novy, and Erik J. Wenninger

Annual Meeting of the Pacific Branch of *Apr 2017*
the Entomological Society of America, Portland, OR
'Observing the settling behavior of the potato/tomato psyllid,
Bactericera cockerelli (Šulc) on different potato germplasms'
Austin N. Fife, Arash Rashed, Regina Cruzado Gutierrez,
Richard Novy, and Erik J. Wenninger

Poster Presentations

ECOIPM - Ornamental Workshop on Diseases and Insects, Hendersonville, NC *Oct 2018*
'Preliminary volatile analysis from RRV - infected roses'
Austin N. Fife, Xavier Martini, and Mathews Paret

XXV International Congress of Entomology, Orlando, FL *Sep 2016*
'Settling behavior of the potato psyllid, *Bactericera cockerelli* (Šulc), (Hemiptera: Triozidae)
on potato germplasm with putative resistance to *Candidatus* Liberibacter solanacearum (Lso)'
Austin N. Fife, Arash Rashed, Regina Cruzado Gutierrez, Richard Novy, and
Erik J. Wenninger

Entomological Society of America - 62nd Annual Meeting, Portland, OR *Nov 2014*
'Population Survey of St. Anthony Dunes tiger beetle, *Cicindela arenicola* (Coleoptera: Cicindelidae)'
Austin N. Fife, Ismael E. Ramirez, and John Zenger

EXTENSION ACTIVITIES

My goal for agricultural extension activities is to address the concerns of growers, shareholders, and the public. I believe that empathy and relationships are crucial for adoption of best management practices. By drawing upon their collective knowledge, we can collaborate to enhance agriculture for the benefit of all.

I have published an extension article, presented at local clubs twice, and directed activities which augmented participants' knowledge of beneficial insects, pests, and their control: Presented collections of insect pests at the NFREC-Quincy Arts & Garden Festival. Taught a K-12 and adults audience about arthropod body plans. Demonstrated insect pinning methods to preteens and discussed insect collecting at local 4-H meetings of Insect Club. Demonstrated a 'build-a-bug' activity and encouraged handling of live insects during the 6th and 7th Tallahassee Science Festivals, compared generalists to specialist predators as learning activity for first grade students for the North Florida Research and Education Center - Agriculture Adventures and Ecology Field days.

Extension Publications

UF IFAS Extension Publication - Gardening in the Panhandle *Aug 2020*
'Help Us Keep A Watch Out for Rose Rosette Disease - *Phyllocoptes fructiphilus*: a new threat for Florida roses'
Austin N. Fife, Gary Knox, Mathews Paret, and Xavier Martini

Oral Presentations

New Threats from Rose Rosette Virus and the Eriophyid Mite Vector, Tallahassee, FL *2020*
'Discovery of the RRD eriophyid mite vector in Florida and mite history and biology'
Austin N. Fife, Gary Knox, Xavier Martini, and Mathews Paret

Presentation for the Tallahassee Rose Society, Tallahassee, FL *Jan 2020*
'Rose Rosette Disease'
Austin N. Fife, Gary Knox, Xavier Martini, and Mathews Paret

GRANTS, AWARDS & SKILLS

Florida Nursery, Growers and Landscape Association Endowed Research Fund *$4,956*
'Survey of the invasive mite *Phyllocoptes fructiphilus*, Rose Rosette Virus (RRV), and predatory mites in Northern Florida'
Austin N. Fife and Xavier Martini

APS Foundation Virology Travel Award - Plant Health 2021 (Online) *2021*
Abstract Award - Acarological Society of America *2019*
Master's Student Paper Competition - 3rd Place - Florida Entomological Society *2018*
Master's Student Paper Competition - 2nd Place - Pacific Branch ESA *2017*
Student Travel Grant - Pacific Branch ESA *2017*
Spanish - oral and written *Fluent*
Programming Languages - R, LaTex *Proficient*