

**Mohammad Arif**  
**College of Tropical Agriculture and Human Resources**  
(Plant and Environmental Protection Sciences)  
FTE Distribution: 35% I; 65% R

**Education**

<u>Degree</u>	<u>University</u>	<u>Major</u>
Bachelors	G. B. Pant University of Agriculture & Technology	Agriculture
Masters	G. B. Pant University of Agriculture & Technology	Molecular Biology & Biotech.
PhD	Jamia Millia Islamia	Biosciences
PG Diploma	Jamia Hamdard	Bioinformatics

**Professional Appointments**

<u>Title</u>	<u>Employer</u>	<u>Dates Employed</u>
Associate Researcher	University of Hawaii Manoa	Aug 2022
Assistant Researcher	University of Hawaii Manoa	Oct 2016
Post-Doctoral Research Associate	Kansas State University	Oct 2013
Post-Doctoral Research Associate	Washington State University	Sep 2012
Post-Doctoral Research Associate	Oklahoma State University	Feb 2009

**Courses Taught**

Course Number and Title (credits)

- PEPS 606 Biology of Plant Pathogens: Viruses and Bacteria (4; co-teach)
- PEPS 615L Diagnosis and Management of Tropical Plant Diseases and Pests (2)
- PEPS/MBBE 627 Molecular Diagnostics: Principles and Practices (3)
- PEPS 660 Seminar Tropical Plant Pathology (1)
- PEPS 691 Special Topic (1-3)
- PEPS 746 Advanced Plant-Bacterial Interactions (3; not taught yet)

**Publications (reverse chronological order)**

Refereed Journal Publications (ONLY after joining UHM)

**2023**

1. Arizala D, Arif M (2023). Impact of homologous recombination on core genome evolution and host adaptation of *Pectobacterium parmentieri*. BioRxiv. doi: <https://doi.org/10.1101/2023.12.15.571927>
2. Czajkowski R, Arif M, Chapman T (2023). Editorial: Genome-wide analyses of *Pectobacterium* and *Dickeya* species, volume II. *Frontiers in Plant Science*. doi: <https://doi.org/10.3389/fpls.2023.1224293>
3. Klair D, Dobhal S, Ahmad A, Hassan ZU, Uyeda J, Silva J, Wang K-H, Kim S, Alvarez AM, \*Arif M (2023). Exploring taxonomic and functional microbiome of Hawaiian stream and spring irrigation water systems using Illumina and Oxford Nanopore sequencing platforms. *Frontiers in Microbiology*. doi: <https://doi.org/10.3389/fmicb.2023.1039292>
4. Chuang S, Dobhal S, Alvarez AM, Arif M (2023). Three new species, *Xanthomonas hawaiiensis* sp. nov., *Stenotrophomonas aracearum* sp. nov., and *Stenotrophomonas oahuensis* sp. nov., isolated from Araceae family. *BioRxiv*. doi: <https://doi.org/10.1101/2023.09.17.558166>
5. Paudel S, Dobhal S, Lowe-Power T, Schlub RL, Hu J, Caitilyn A, Alvarez AM, Arif M (2023). "RSSC-Lineage Multiplex PCR" assay detects and differentiates *Ralstonia solanacearum*, *R. pseudosolanacearum*, *R. syzygii* and the R3bv2 subgroup. *Phytofrontiers*. doi: <https://doi.org/10.1094/PHYTOFR-07-23-0087-R>
6. Lowe-Power T, Sharma P, Alfenas-Zerbini P, Alvarez B, Arif M, Baroukh C, Biosca EG, Bocsanczy AM, Castillo J, Cellier G, Coutinho TA, Drenth A, Friman VP, Genin S, Guidot A, Hikichi Y, Huang Q, Iyer-Pascuzzi AS, Kai K, Pecrix Y, Poussier S, Ray JD, Rossato M, Schomer RA, Siri MI, Vinatzer B, Allen C (2023). Letter to the Editor: The *Ralstonia* research community rejects the proposal to classify phylotype I *Ralstonia* into the new species *Ralstonia nicotianae*. *Phytofrontiers*. doi: <https://doi.org/10.1094/PHYTOFR-06-23-0071-LE>

- Growth-Helms D, Rivera Y, Martin FN, Arif M, Sharma P, Castlebury LA (2023). Terminology and Guidelines for Diagnostic Assay Development and Validation: Best Practices for Molecular Tests. *Phytofrontiers*. <https://doi.org/10.1094/PHYTOFR-05-22-0059-FI>

## 2022

- \*Arif M, Czajkowski R, Chapman T (2022). Editorial: Genome-wide analyses of *Pectobacterium* and *Dickeya* species. *Frontiers in Plant Science*. doi:10.3389/fpls.2022.822829
- Zhang J, \*Arif M, Shen H, Sun D, Pu X, Hu J, Lin B, Yang Q (2022). Genomic comparisons and phenotypic diversity of *Dickeya zea* strains causing bacterial soft rot of banana in China. *Frontiers in Plant Science*, 13:822829. doi:10.3389/fpls.2022.822829
- DeLude A, Wells R, Boomla S, Chuang S, Urena F, Shipman A, Rubas N, Kuehu DL, Bickerton B, Peterson T, Dobhal S, Arizala D, Klair D, Ochoa-Corona FM, Ali ME, Odani J, Bingham JP, Jenkins D, Fletcher J, Stack JP, Alvarez AM, \*Arif M (2022). Loop-mediated isothermal amplification (LAMP) assay for specific and rapid detection of *Dickeya fangzhongdai* targeting a unique genomic region. *Scientific Reports*, 12:19193, doi.org/10.1038/s41598-022-22023-4
- Klair D, Arizala D, Dobhal S, Boluk G, Alvarez AM, \*Arif M (2022). *Pectobacterium colocasium* sp. nov. isolated from taro (*Colocasia esculenta*). *BioRxiv*. Doi:10.1101/2022.02.08.479620
- Arizala D, Dobhal S, Alvarez AM, \*Arif M (2022). Elevation of *Clavibacter michiganensis* subsp. *californiensis* to species level as *Clavibacter californiensis* sp. nov., merging and re-classification of *Clavibacter michiganensis* subsp. *chilensis* and *Clavibacter michiganensis* subsp. *phaseoli* as *Clavibacter phaseoli* sp. nov. based on complete genome in silico analyses. *Int J Syst Evol Microbiol*, 72(9), doi: 10.1099/ijsem.0.005427
- Boluk G, Dobhal S, Arizala D, Alvarez AM, \*Arif M (2022). *Dickeya colocasiae* sp. nov. isolated from wetland taro, *Colocasia esculenta*. *BioRxiv*. Doi:10.1101/2022.01.14.476417
- Arizala D, Dobhal S, Babler B, Crockford A, Rioux RA, Alvarez AM, \*Arif M (2022). Development of a multiplex TaqMan qPCR targeting unique genomic regions for the specific and sensitive detection of *Pectobacterium* species and *P. parmentieri*. *J Appl Microbiol*, 132(4), 3089-3110. doi.org/10.1111/jam.15447

## 2021

- Boluk G, Arizala D, Dobhal S, Zhang J, Hu J, Alvarez AM, \*Arif M (2021). Genomic and phenotypic biology of novel strains of *Dickeya zea* isolated from pineapple and taro in Hawaii: insights into genome plasticity, pathogenicity, and virulence determinants. *Frontiers in Plant Science*. doi:10.3389/fpls.2021.663851
- Domingo R, Perez C, Klair D, Vu H, Candelaria-Tochiki A, Wang X, Camson A, Uy JN, Salameh M, Arizala D, Dobhal S, Boluk G, Bingham JP, Ochoa-Corona F, Ali ME, Stack JP, Fletcher J, Odani J, Jenkins D, Alvarez AM, \*Arif M (2021). Genome-informed loop-mediated isothermal amplification assay for specific detection of *Pectobacterium parmentieri* in infected potato tissues and soil. *Scientific Reports*, 11, 21948. doi.org/10.1038/s41598-021-01196-4
- Arif M, Busot GY, Mann R, Rodoni B, Stack JP (2021). Field-deployable recombinase polymerase amplification assay for specific, sensitive and rapid detection of the US Select Agent and toxigenic bacterium, *Rathayibacter toxicus*. *Biology*, 10, 620. doi.org/10.3390/biology10070620
- Larrea-Sarmiento A, Stack JP, Alvarez AM, \*Arif M (2021). Multiplex recombinase polymerase amplification assay developed using unique genomic regions for rapid on-site detection of genus *Clavibacter* and *C. nebraskensis*. *Scientific Reports*, 11, 12017. doi.org/10.1038/s41598-021-91336-7
- Klair D, Silva J, Arizala D, Boluk G, Dobhal S, Ahmad AA, Uyeda J, Alvarez AM, \*Arif M (2021). First Report of *Pectobacterium brasiliense* causing soft rot on mizuna (*Brassica rapa* var. *japonica*) in the United States. *Plant Dis*. doi.org/10.1094/PDIS-03-21-0644-PDN
- Arif M, Busot GY, Mann R, Rodoni B, Stack JP (2021). Multiple internal controls enhance reliability for PCR and real time PCR detection of *Rathayibacter toxicus*. *Scientific Reports*, 11, 8365; doi.org/10.1038/s41598-021-87815-6
- Klair D, Boluk G, Silva J, Arizala D, Dobhal S, \*Arif M (2021). First report of bacterial soft rot disease on pak choi (*Brassica rapa* subsp. *chinensis*) caused by *Pectobacterium brasiliense* in the United States. *Plant Dis*. doi.org/10.1094/PDIS-08-20-1854-PDN
- Ramachandran S, Dobhal S, Alvarez AM, \*Arif M (2021). Improved multiplex TaqMan qPCR assay with universal internal control offers reliable and accurate detection of *Clavibacter michiganensis*. *J Appl Microbiol*, doi.org/10.1111/jam.15017

## 2020

23. Paudel S, Dobhal S, Alvarez AM, \*Arif M (2020). Taxonomy and phylogenetic research on *Ralstonia solanacearum*: a complex pathogen with extraordinary economic consequences. *Pathogens*, 9, 886; doi.org/10.3390/pathogens9110886
24. Zhang J, Arif M, Shen H, Hu J, Sun D, Pu X, Yang Q (2020). Genomic divergence between *Dickeya zae* strain EC2 isolated from rice and previously identified strains, suggests a different rice foot rot strain. *PLoS ONE* 15(10), e0240908. doi.org/10.1371/journal.pone.0240908
25. Yasuhara-Bell J, Arif M, Busot G, Mann R, Rodoni B, Stack J (2020). Comparative genomic analysis confirms five genetic populations of the Select Agent, *Rathayibacter toxicus*. *Microorganisms* 8, 366; doi:10.3390/microorganisms8030366
26. Andreason SA, Arif M, Brown JK, Ochoa-Corona F, Fletcher J, Wayadande A (2020). Exploring the use of high-resolution melting analysis and helicase-dependent amplification for discrimination of *Bemisia tabaci* (Hemiptera: Aleyrodidae) cryptic species and *Trialeurodes vaporariorum*, *J Econ Entomol*, doi.org/10.1093/jee/toaa180
27. Boluk G, Arizala D, Ocenar J, Mokwele J, Silva J, Dobhal S, Uyeda J, Alvarez AM, \*Arif M (2020). First report of *Pectobacterium brasiliense* causing soft rot on *Brassica oleracea* var. *sabellica* L. in Hawaii, United States. *Plant Dis*. doi.org/10.1094/PDIS-04-20-0701-PDN
28. Arizala D, Dobhal S, Paudel S, Boluk G, Silva J, Ahmad AA, Uyeda J, Sugano J, Alvarez AM, \*Arif M (2020). First report of *Pectobacterium brasiliense* causing bacterial soft rot and blackleg diseases of potato in Hawaii. *Plant Dis* doi.org/10.1094/PDIS-02-20-0395-PDN
29. Dobhal S, Boluk G, Babler B, Stulberg MJ, Rascoe J, Nakhla M, Chapman T, Crockford AB, Melzer M, Alvarez AM, \*Arif M (2020). Comparative genomics approach for identifying signature regions to develop a robust and highly reliable multiplex TaqMan real-time qPCR assay for sensitive detection of the genus *Dickeya* and *Dickeya dianthicola*. *J Appl Microbiol*, doi.org/10.1111/jam.14579
30. Boluk G, Dobhal S, Crockford AB, Melzer MJ, Alvarez AM, \*Arif M (2020). Genome-informed recombinase polymerase amplification assay coupled with a lateral flow device for in-field detection of *Dickeya* species. *Plant Dis*. doi.org/10.1094/PDIS-09-19-1988-RE

## 2019

31. Arizala D, \*Arif M (2019). Comprehensive comparative genomics analyses revealed remarkable heterogeneity in pathogenicity determinants, antimicrobial compounds, and CRISPR-Cas systems of complex phytopathogenic genus *Pectobacterium*. *Pathogens*, 8, 247, doi:10.3390/pathogens8040247
32. Arizala D, Dobhal S, Paudel S, Gunarathne S, Boluk G, \*Arif M (2019). First report of bacterial soft rot and blackleg on potato caused by *Pectobacterium parmentieri* in Hawaii. *Plant Dis*. doi.org/10.1094/PDIS-09-19-1894-PDN.
33. Dhakal U, Dobhal S, Alvarez AM, \*Arif M (2019). Phylogenetic analyses of xanthomonads causing bacterial leaf spot of tomato and pepper: *Xanthomonas euvesicatoria* revealed homologous populations despite distant geographical distribution. *Microorganisms*, 7, 462, doi:10.3390/microorganisms7100462.
34. Larrea-Sarmiento A, Alvarez AM, Stack JP, \*Arif M (2019). Synergetic effect of non-complementary 5' AT-rich sequences on the development of a multiplex TaqMan real-time PCR for specific and robust detection of *Clavibacter michiganensis* and *C. michiganensis* subsp. *nebraskensis*. *PLoS ONE* 14(7):e0218530, doi.org/10.1371/journal.pone.0218530.
35. Ocenar J, Arizala D, Boluk G, Dhakal U, Gunarathne S, Paudel S, Dobhal S, \*Arif M (2019). Development of a robust, field-deployable loop-mediated isothermal amplification (LAMP) assay for specific detection of potato pathogen *Dickeya dianthicola* targeting a unique genomic region. *PLoS ONE*, 14 (6): e0218868, doi.org/10.1371/journal.pone.0218868.
36. Dobhal S, Larrea-Sarmiento A, Alvarez A, \*Arif M (2019). Development of a loop-mediated isothermal amplification assay for specific detection of all known subspecies of *Clavibacter michiganensis*. *J Appl Microbiol*, 126, 388-401. DOI: 10.1111/jam.14128.
37. Boluk G, \*Arif M (2019). First report of *Dickeya dianthicola* as a causal agent of bacterial soft rot of potato in Hawaii. *Plant Dis*, doi.org/10.1094/PDIS-11-18-2094-PDN

## 2018

38. Ahmed F, Larrea-Sarmiento A, Alvarez A, \*Arif M (2018). Genome-informed diagnostics for specific and rapid detection of *Pectobacterium* species using recombinase polymerase amplification coupled with a lateral flow device. *Scientific Reports*, 8, 15972. DOI: 10.1038/s41598-018-34275-0.

39. Larrea-Sarmiento A, Dhakal U, Boluk G, Fatdal L, Alvarez A, Strayer A, Paret M, Jones J, Jenkins D, \*Arif M (2018). Development of a genome-informed loop-mediated isothermal amplification assay for rapid and specific detection of *Xanthomonas euvesicatoria*. *Scientific Reports*, 8, 14298. DOI:10.1038/s41598-018-32295-4
40. Hynson N, Frank K, Alegado R, Amend A, Arif M, Bennett G, Jani A, Medeiros M, Mileyko Y, Nelson C, Nguyen N, Nigro O, Priscic S, Takagi D, Wilson S, Yew J, Shin S (2017). Synergy among microbiota and their hosts: leveraging the Hawaiian archipelago and local collaborative networks to address pressing questions in microbiome research. *mSystems*, 3, e00159-17

## 2017

41. Ahmed FA, Arif M, Alvarez AM (2017). Antibacterial effect of potassium tetraborate tetrahydrate against soft rot disease agent *Pectobacterium carotovorum* in tomato. *Front Microbiol*, 8, 1728. doi: 10.3389/fmicb.2017.01728
42. Yasuhara-Bell J, Marrero G, Arif M, de Silva A, Alvarez AM (2017). Development of a loop-mediated isothermal amplification (LAMP) assay for the detection of *Dickeya* spp. *Phytopathology*, 107 (11), 1339-1345. doi.org/10.1094/PHYTO-04-17-0160-R
43. Andreason SA, Arif M, Brown JK, Ochoa-Corona F, Fletcher J, Wayadande A (2017). Single-target and multiplex discrimination of whiteflies (Hemiptera: Aleyrodidae) *Bemisia tabaci* and *Trialeurodes vaporariorum* with modified priming oligonucleotide thermodynamics, *J Econ Entomol*, 110 (4), 1821-1830. doi: 10.1093/jee/tox125

## Leadership Roles (Committees, Boards, Advisory, etc.)

- Editor, “Frontiers in Microbiology”, 10/2021 – present
- Editor, Nature Publishing Group Journal “Scientific Reports”, 05/2019 - present
- Guest Editor, Special Issue “Research in the Identification and Control Methods of Rot Diseases in Plants” for “Frontiers in Microbiology”, 07/2023 – present.
- Guest Editor, Special Issue Volume II (Genome-wide analyses of *Pectobacterium* and *Dickeya* species) for “Frontiers in Plant Sciences”, 09/2021 – 12/2022.
- 2022 Outstanding Associate Editor for Plant Microbe and Virus Interactions with Plants — Frontiers in Microbiology.
- Guest Editor, Special Issue (Genome-wide analyses of *Pectobacterium* and *Dickeya* species) for “Frontiers in Plant Sciences”, since 04/2020 – 02/2021.
- Guest Editor, Special Issue (Advances on Bacterial Genomics) for “International Journal of Molecular Sciences”, since 02/2020 – 06/2021.
- Senior Editor, American Phytopathological Society’s Journal “Plant Health Progress”, 01/2018 – present
- Review Panelist USDA NIFA grants, 2021, 2022, 2023
- Review panelist for pierce disease proposals, California Department of Food & Agriculture, 03/2018, 3/2019, 3/2022
- Member, APHIS Widely Prevalent Bacteria Committee, represent Hawaii and Guam, 2018 – present
- Chair (in 2021) and Vice Chair (in 2020), APS Emerging Diseases and Pathogens Committee
- CTAHR Senator, 08/2019 – present (SEC member 08/2022 - continue)
- Alternative Responsible Officer (ARO) for the Select Agent Program at the University of Hawaii, Feb 2018 – present
- Member of TAE Curriculum Committee, Department of Plant Environmental Protection Sciences, University of Hawaii, Aug 2017 – July 2019
- Member of Gamma Sigma Delta, The Honor Society of Agriculture, 2017 - present
- Co-instructor in a training workshop, “Plant Biosecurity in Theory and Practice”, Biosecurity Research Institute, Kansas State University, Manhattan, KS, USA. Provided the hands-on biocontainment training to the students/postdocs/scientists from >15 countries every year, 2015 - present
- Organized a workshop, “Principles of Diagnostic Assay Validation”, American Phytopathological Society Annual Meeting, San Antonio, TX, USA, 08/2017
- Member of Professional Societies, American Phytopathological Society (2009 - present)
- Member of Professional Societies, American Society for Microbiology (2009 -2010; 2017 - present)
- Member of the American Phytopathological Society’s Bacteriology committee since 2016 - present.

## Graduate Students

<u>Category</u>	<u>Current Number of Students</u>	<u>Number Graduated (Career)</u>
Chair of Master's Committees	1	5
Chair of PhD Committees	2	3
Member of Master's Committees	1	2
Member of PhD Committees	5	3

## Grant Support

Title of Grant: Cultivating the nextgen of diverse biosecurity professionals through a Pacific-Continental Network (PaCoN)

Source of Grant: USDA NIFA

Total Dollar Value (Your share of the grant value): \$7,405,166

Dates of Grant: 06/2023 – 05/2028

Role (PI, Co-PI): PI

Title of Grant: Detection and tracking system for bacterial threats to potato and vegetable industries.

Source of Grant: USDA NIFA AFRI

Total Dollar Value (Your share of the grant value): \$295,589

Dates of Grant: 03/2023 – 03/2025

Role (PI, Co-PI): PI

Title of Grant: Integrative Center for Environmental Microbiomes and Human Health Phase II.

Source of Grant: NIH-NIGMS

Total Dollar Value (Your share of the grant value): \$10,729,794 (\$909,375)

Dates of Grant: 08/2023 – 07/2028

Role (PI, Co-PI): RPL (Research Project Leader)

Title of Grant: Epidemiology, genome biology and evolution of *Ralstonia solanacearum* associated with ironwood decline.

Source of Grant: Office of the Associate Dean/Director for Research, CTAHR, UHM

Total Dollar Value (Your share of the grant value): \$125,000

Dates of Grant: 10/2023 – 9/2028

Role (PI, Co-PI): PI

Title of Grant: Genome-informed next-generation detection protocols for pests and pathogens of specialty crops in Hawaii.

Source of Grant: Specialty Crops PBARC/CTAHR program, CTAHR, UHM

Total Dollar Value (Your share of the grant value): \$225,461

Dates of Grant: 10/2020 – 9/2024

Role (PI, Co-PI): PI

Title of Grant: 'Omics' from source to sink: microbiome of stream irrigation system and its potential impact.

Source of Grant: NIH COBRE

Total Dollar Value (Your share of the grant value): \$421,180

Dates of Grant: 08/2021 – 07/2023

Role (PI, Co-PI): PI

Title of Grant: EDNA-Bacteria for detection of six Select Agents and quarantine bacteria for the continental U.S. and Hawaii.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$159,979 (\$58,978)

Dates of Grant: 10/2020 – 09/2021

Role (PI, Co-PI): Co-PI

Title of Grant: Irrigation water microbiome and its impact on the environment and human health.

Source of Grant: NIH COBRE Pilot Project

Total Dollar Value (Your share of the grant value): \$35,375 (\$35,375)

Dates of Grant: 01/2020 – 10/2020

Role (PI, Co-PI): PI

Title of Grant: Nanobubble Technology Applications in Aquaculture, Aquaponics, Hydroponics, Environment, Food and Food Safety.

Source of Grant: Office of the Associate Dean/Director for Research, CTAHR, UHM

Total Dollar Value (Your share of the grant value): \$80,000 (\$0)

Dates of Grant: 10/2019 – 9/2020

Role (PI, Co-PI): Co-PI

Title of Grant: Development of molecular methods to detect *Xanthomonas oryzae* pv. *oryzae* and *X. oryzae* pv. *oryzicola*.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$103,267

Dates of Grant: 10/2019 – 09/2021

Role (PI, Co-PI): PI

Title of Grant: Restoring *Casuarina equisetifolia* as an agroforestry species in Guam through replacement of bacterial wilt infected trees and research into bacterial microbiomes and associated termites

Source of Grant: WSARE-USDA

Total Dollar Value (Your share of the grant value): \$304,273 (\$105,000)

Dates of Grant: 08/2019-07/2022

Role (PI, Co-PI): Co-PI

Title of Grant: Development of molecular methods to detect *Ralstonia solanacearum* Race3 Biovar2 in field settings.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$64,370

Dates of Grant: 10/2019 – 09/2020

Role (PI, Co-PI): PI

Title of Grant: Genome-based circumscription and phenotyping of regulated microbes, especially the select agent *Ralstonia solanacearum*.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$235,086 (\$17,000)

Dates of Grant: 09/2019 – 08/2020

Role (PI, Co-PI): Co-PI

Title of Grant: Epidemiology, population genetics and comparative genomics of *Ralstonia Solanacearum* associated with ironwood disease.

Source of Grant: Office of the Associate Dean/Director for Research, CTAHR, UHM

Total Dollar Value (Your share of the grant value): \$125,000

Dates of Grant: 10/2018 – 9/2023

Role (PI, Co-PI): PI

Title of Grant: Validation of LAMP for sensitive and reliable detection of the Select Agent, *Rathayibacter toxicus*

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$30,000

Dates of Grant: 09/2018 – 08/2019

Role (PI, Co-PI): PI

Title of Grant: Development of molecular methods to detect *Dickeya* spp. and specifically, *D. solani*.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$60,289

Dates of Grant: 09/2018 – 08/2019

Role (PI, Co-PI): PI

Title of Grant: Survey of Solanaceous vegetable crops for *Ralstonia solanacearum* r3 b2, Candidatus Phytoplasma australiense in Hawaii.

Source of Grant: FARMBILL (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$53,647

Dates of Grant: 09/2018 – 08/2019

Role (PI, Co-PI): PI

Title of Grant: Epidemiology, phylogenetics and comparative genomics of *Dickeya* sp. causing diseases of pineapple, corn and taro.

Source of Grant: Office of the Associate Dean/Director for Research, College of Tropical Agriculture and Human Resources

Total Dollar Value (Your share of the grant value): \$80,000

Dates of Grant: 10/2017 – 9/2019

Role (PI, Co-PI): PI

Title of Grant: Survey for *Rathayibacter toxicus* and other high consequence bacterial pathogens on annual ryegrass and other grasses of *poaceae* family

Source of Grant: CAPS (USDA/APHIS/PPQ)

Total Dollar Value (Your share of the grant value): \$21,139

Dates of Grant: 07/2018 – 06/2019

Role (PI, Co-PI): PI

Title of Grant: Faculty Travel Fund

Source of Grant: Office of the Vice Chancellor for Research

Total Dollar Value (Your share of the grant value): \$2,000

Dates of Grant: 08/2017

Role (PI, Co-PI): PI

## **Proceedings**

### **2020**

Title: Ecology of Guam's *Casuarina equisetifolia* and research into its decline

Authors (put an asterisk on the presenter): \*Robert L. Schlub, Caleb M. Ayin, Anne M. Alvarez, Sujana Paudel, Mohammad Arif, Brian D. Marx, Claudia Husseneder, Karl A. Schlub, Marisol Quintanilla, Ned B. Klopfenstein, Lisa F. Kennaway, Yong Zhang, Chonglu Zhong, Abel Nicodemus

Name of Workshop: Proceedings of the Sixth International Casuarina Workshop

Title of the Proceeding: Casuarinas for green economy and environmental sustainability by Haruthaithanasan M, Pinyopusarerk K, Nicodemus A, Bush D, Thomson L.

Location: Krabi, Thailand

Date of Presentation: October 21-25, 2019

## **Presentations at Conferences**

### **2023**

Title: Advancement in plant pathogen diagnostics in high-throughput sequencing era.

Authors (put an asterisk on the presenter): \*Arif M, Stack JP

Name of Conference: ICPP

Location: Lyon, France

Date of Presentation: 08/2023

Title: Interactions and genome biology of *Dickeya fangzhongdai*: A potential threat to potato industry

Authors (put an asterisk on the presenter): \*Dobhal S, Arizala D, Boluk G, Arif M

Name of Conference: ICPP

Location: Lyon, France

Date of Presentation: 08/2023

Title: Genomic and phenotypic biology of novel strains of *Dickeya zeae*.

Authors (put an asterisk on the presenter): \*Boluk G, Arizala D, Dobhal S, Alvarez AM, Arif M

Name of Conference: ICPP

Location: Lyon, France

Date of Presentation: 08/2023

Title: Genome biology and evolution of *Clavibacter michiganensis*.

Authors (put an asterisk on the presenter): \*Arif M, Arizala D, Larrea-Sarmiento A, Dobhal S.

Name of Conference: ICPP

Location: Lyon, France

Date of Presentation: 08/2023

Title: Development of recombinase polymerase amplification assays for specific detection of *Xanthomonas oryzae* pv. *oryzae* and *Xanthomonas oryzae* pv. *oryzicola*

Authors (put an asterisk on the presenter): \*Dobhal S, Arif M

Name of Conference: ICPP

Location: Lyon, France

Date of Presentation: 08/2023

Title: BacPath: Diagnostics pipeline for highly reliable detection of bacterial plant pathogens.

Authors (put an asterisk on the presenter): \* Montesinos S, Dobhal S, Arif M

Name of Conference: APS Annual Meeting - Plant Health 2023

Location: Denver, CO

Date of Presentation: 08/2023

Title: Three new species, *Xanthomonas hawaiiensis* sp. nov., *Stenotrophomonas aracearum* sp. nov., and *Stenotrophomonas oahuensis* sp. nov., isolated from Araceae.

Authors (put an asterisk on the presenter): \*Chuang SC, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting - Plant Health 2023

Location: Denver, CO

Date of Presentation: 08/2023

Title: *Ralstonia* infection in ironwood trees negatively impacts the diversity of the endophytic microbiome.

Authors (put an asterisk on the presenter): Klair D, Dobhal S, \*Montesinos S, Delorm J, Schlub R, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting - Plant Health 2023

Location: Denver, CO

Date of Presentation: 08/2023

Title: Comparative genomic analyses revealed flagellar biosynthesis as a key virulence factor in the *Xanthomonas euvesicatoria*-panax pathosystem.

Authors (put an asterisk on the presenter): \*Chuang SC, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting - Plant Health 2023

Location: Denver, CO



Date of Presentation: 08/2023

Title: Genome-Informed Loop-Mediated Isothermal Amplification (LAMP) Assay for Rapid and Specific Detection of *Dickeya dadantii*.

Authors (put an asterisk on the presenter): \*Montesinos S, Tyagi G, Feng Z, Hampson E, Adhikari A, Minaai M, Wong L, Haubner M, Arizala D, Dobhal S, Arif M

Name of Conference: APS Annual Meeting - Plant Health 2023

Location: Denver, CO

Date of Presentation: 08/2023

## 2022

Title: Pacifica Bacterial Collection at the University of Hawaii: A valuable resource for genetic, evolutionary, taxonomic and epidemiological studies

Authors (put an asterisk on the presenter): \*Arif M

Name of Conference: APS Annual Meeting

Location: Pittsburgh, PA

Date of Presentation: 08/2022

Title: Taxonomic and functional microbiome analyses of stream and spring irrigation water systems using illumina and nanopore sequencing platforms.

Authors (put an asterisk on the presenter): Klair D, Dobhal S, \*Arif M

Name of Conference: APS Annual Meeting

Location: Pittsburgh, PA

Date of Presentation: 08/2022

Title: Homologous recombination in core genomes impacts phylogeny, virulence, and host adaptation of *Pectobacterium pectobacterium*.

Authors (put an asterisk on the presenter): 2. \*Arizala D, Arif M

Name of Conference: APS Annual Meeting

Location: Pittsburgh, PA

Date of Presentation: 08/2022

## 2021

Title: The future of plant diagnostics and disease surveillance (part 2).

Authors (put an asterisk on the presenter): \*Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2021

Title: Comparative genomics and phylogenetic analyses suggest a taxonomic re-organization and inclusion of a new species in the genus *Clavibacter*

Authors (put an asterisk on the presenter): \*Arizala D, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2021

Title: Phylogenetic characterization and genealogy of strains in the *Ralstonia solanacearum* species complex associated with ironwood decline in Guam.

Authors (put an asterisk on the presenter): Paudel S, Dobhal S, Hu J, Schlub R, Alvarez AM, \*Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2021

Title: Investigating microbial communities associated with source irrigation and wet taro field water using amplicon Oxford Nanopore MinIon sequencing.

Authors (put an asterisk on the presenter): \*Klair D, Dobhal S, Ahmad A, Uyeda J, Silva J, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom  
Date of Presentation: 08/2021

Title: *Xanthomonas* strains isolated from Araceae reveal diverse phylogenetic relationships and origins.  
Authors (put an asterisk on the presenter): \*Chuang S, Dobhal S, Pal K, Amore TD, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2021

Title: Multiplex real-time PCR assay for detection and discrimination of *Ralstonia solanacearum* R3bv2 from other strains in *R. solanacearum* species complex  
Authors (put an asterisk on the presenter): \*Dobhal S, Costanzo S, Paudel S, Stulberg MJ, Rivera Y, Nakhla MK, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2021

Title: Pathological and molecular biology of *Xanthomonas* strains causing bacterial leaf blight of Panax (*Polyscias guilfoylei*) in Hawaii.  
Authors (put an asterisk on the presenter): \*Chuang S, Dobhal S, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2021

Title: Development of loop-mediated isothermal amplification assay for rapid detection of *Pectobacterium parmentieri* in infected potato and soil samples  
Authors (put an asterisk on the presenter): \*Klair D, Domingo R, Perez C, Huong V, Candelario-Tochiki A, Wang S, Camson A, Uy JN, Salameh M, Arizala D, Boluk G, Dobhal S, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2021

Title: Recovery of potato blackleg pathogens and impact of temperature on interactions between *Pectobacterium parmentieri* and *Dickeya dianthicola*  
Authors (put an asterisk on the presenter): \*Shrestha S, Babler B, Dobhal S, Arif M, Rioux R  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2021

## 2020

Title: Evolutionary genomics reveals recombination events involved in speciation, host specificity and pathogenicity in the genus *Clavibacter*  
Authors (put an asterisk on the presenter): \*Arizala D, Dobhal S, Paudel S, Seo HN, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2020

Title: Multitrophic interactions of chromosomally labelled *Pectobacterium* and *Dickeya* species with their host and analysis of pathogenicity determinants  
Authors (put an asterisk on the presenter): \*Dobhal S, Boluk G, Arizala D, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Virtual/Zoom  
Date of Presentation: 08/2020

Title: Multigene based TaqMan qPCR multiplex assay for sensitive and reliable detection of *Dickeya solani*

Authors (put an asterisk on the presenter): \*Dobhal S, Santillana G, Stulberg MJ, Boluk G, Rascoe J, Nakhla MK, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: Comparative Genomics analyses revealed distinct pathogenicity determinants and distinct features between *Dickeya zea* strains from taro and pineapple

Authors (put an asterisk on the presenter): \*Boluk G, Arizala D, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: A unique region revealed through genome-wide analyses was used to develop an RPA assay for detection of the Select Agent *Ralstonia solanacearum* R3bv2

Authors (put an asterisk on the presenter): \*Dobhal S, Paudel S, Stulberg MJ, Rascoe J, Nakhla MK, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: Complete genomic analysis of plant-pathogenic *Pectobacterium* species found associated with soft rot disease of kale

Authors (put an asterisk on the presenter): \*Boluk G, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: Field deployable recombinase polymerase amplification assay for rapid and accurate detection of *Ralstonia solanacearum* species complex

Authors (put an asterisk on the presenter): \*Paudel S, Dobhal S, Stulberg MJ, Rascoe J, Nakhla MK, Seo HN, Schlub RL, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: Comparative genomics analyses of the bacterial blight pathogen of anthurium, *Xanthomonas phaseoli* pv. *dieffenbachiae*

Authors (put an asterisk on the presenter): \*Dobhal S, Arizala D, Chuang SC, Pal K, Amore TD, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: PCR multiplex to differentiate *Ralstonia solanacearum* species complex, including *R. solanacearum*, *R. pseudosolanacearum* and Select Agent R3bv2 strains

Authors (put an asterisk on the presenter): \*Paudel S, Dobhal S, Lowe-Power T, Schlub RL, Allen C, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom

Date of Presentation: 08/2020

Title: Evolutionary relationships and phylogeny of *Dickeya zea* strains based on phenotypic, biochemical and genomic characteristics

Authors (put an asterisk on the presenter): \*Boluk G, Dobhal S, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Virtual/Zoom  
Date of Presentation: 08/2020

## 2019

Title: One Lab - One Protocol: synergetic effect of 5'AT-rich flap to harmonize qPCR protocols for easy, sensitive and cost-effective diagnostics

Authors (put an asterisk on the presenter): \*Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Insights into pathogenicity determinants of *Clavibacter michiganensis* subsp. *michiganensis* and their effects on disease expression

Authors (put an asterisk on the presenter): \*Larrea A, Dobhal S, Alvarez A, Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Comparative genomics of *Pectobacterium* species revealed remarkable heterogeneity in pathogenicity determinants, antimicrobial compounds and CRISPR Cas

Authors (put an asterisk on the presenter): \*Arizala D, Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Comparative genomics approach to develop a highly reliable duplex TaqMan qPCR assay for sensitive detection of genus *Dickeya* and *Dickeya dianthicola*

Authors (put an asterisk on the presenter): Dobhal S, \*Boluk G, Babler B, Stulberg MJ, Rascoe J, Nakhla M, Chapman T, Crockford AB, Melzer M, Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Phylogeny of *Dickeya zea* isolated from different hosts and irrigation water using multi-locus sequence analysis

Authors (put an asterisk on the presenter): \*Boluk G, Dobhal S, Alvarez A, Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: *Xanthomonas euvesicatoria* populations are notably clonal irrespective of distant geographical distribution

Authors (put an asterisk on the presenter): Dhakal U, \*Alvarez AM, Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Robust and highly reliable loop-mediated isothermal amplification (LAMP) assay for specific and sensitive detection of *Dickeya solani*

Authors (put an asterisk on the presenter): Dobhal S, Boluk G, Stulberg MJ, Rascoe J, Nakhla M, \*Arif M

Name of Conference: APS Annual Meeting

Location: Cleveland, OH

Date of Presentation: 08/2019

Title: Multiplex TaqMan qPCR targeting unique genomic regions for specific, sensitive and robust detection of *Pectobacterium* species and *P. parmentieri*

Authors (put an asterisk on the presenter): \*Arizala D, Dobhal S, Crockford AB, Ochoa-Corona F, Alvarez AM,

Arif M

Name of Conference: APS Annual Meeting  
Location: Cleveland, OH  
Date of Presentation: 08/2019

Title: Genome-informed recombinase polymerase amplification assay for specific and sensitive detection of *Dickeya* species at point-of-care

Authors (put an asterisk on the presenter): \*Boluk G, Dobhal S, Crockford AB, Melzer M, Alvarez AM, Arif M  
Name of Conference: APS Annual Meeting  
Location: Cleveland, OH  
Date of Presentation: 08/2019

Title: Detection of *Clavibacter michiganensis* and *C. michiganensis* ssp. *nebraskensis* using multiplex recombinant polymerase amplification coupled with LFD

Authors (put an asterisk on the presenter): \*Larrea A, Alvarez A, Arif M  
Name of Conference: APS Annual Meeting  
Location: Cleveland, OH  
Date of Presentation: 08/2019

## 2018

Title: Development of genome-informed diagnostics for detection of *Pectobacterium* species using recombinase polymerase amplification coupled with LFD

Authors (put an asterisk on the presenter): \*Ahmed F, Larrea A, Alvarez A, Arif M  
Name of Conference: ICPP Meeting  
Location: Boston, MA  
Date of Presentation: 08/2018

Title: Genome-informed LAMP assays for specific detection of bacterial spot-causing bacteria, *Xanthomonas euvesicatoria* and *X. vesicatoria*.

Authors (put an asterisk on the presenter): Fatdal L, \*Boluk G, Larrea A, Dhakal U, Alvarez A, Strayer AL, Paret M, Jones J, Jenkins D, Arif M  
Name of Conference: ICPP Meeting  
Location: Boston, MA  
Date of Presentation: 08/2018

## 2017

Title: Pan-Genome Analyses of Black Rot Pathogen of Crucifers, *Xanthomonas campestris* pv. *campestris*

Authors (put an asterisk on the presenter): Larrea A, Alvarez A, Stack JP, \*Arif M  
Name of Conference: APS Annual Meeting  
Location: Boston, MA  
Date of Presentation: 08/2017

Title: CRISPR/Cas sequence-based confirmation of an emergent population of *Rathayibacter toxicus* in South Australia.

Authors (put an asterisk on the presenter): Stack JP, Busot GY, \*Arif M  
Name of Conference: APS Annual Meeting  
Location: Boston, MA  
Date of Presentation: 08/2017

Title: Validation of species-specific primers for detection and discrimination of *Pythium aphanidermatum* and *P. delicense*

Authors (put an asterisk on the presenter): \*Wallace S, Proaño MF, Espindola AS, Arif M, Daughtrey M, Garzon CD  
Name of Conference: APS Annual Meeting  
Location: Boston, MA  
Date of Presentation: 08/2017

