Kelsey McCalla (Schall)

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EDUCATION

2009-2013	**University of California, Santa Barbara, CA; Bachelor of Arts, Biology;** 3.8 GPA; College of Creative Studies Biology Major
2013-present	**University of California, Riverside, CA;** 3.93 GPA; Ph.D. Candidate for Entomology Major; biological control and integrated pest management focus; Graduation date: December, 2019

EMPLOYMENT HISTORY

April 2012- June 2013	**Undergraduate Researcher -** Parasitology Lab; Director: Armand Kuris, Ph.D.; UCSB
June 2013-present	**Graduate Student Researcher -** Biological Control Lab; Director: Mark Hoddle, Ph.D.; UCR

RESEARCH SPECIALIZATION

My primary research interest is in the development and implementation of highly efficacious, economically feasible, and environmentally sustainable methods for biological control and integrated pest management (IPM) of agricultural insect pests. Using California citrus as a model, I have investigated the long-term ecological and economic consequences of tri-trophic interactions among invasive ants (e.g., Argentine ant, RIFA), disease vectoring ant-tended hemipteran pests, (e.g., Asian citrus psyllid, citrus mealybug, citrus aphid, and scale spp.), and associated natural enemy predators and parasitoids critical for biocontrol of these pests. In an effort to prevent economic losses resulting from heavy infestations of invasive ants and ant-tended hemipteran pests, I led several projects independently and through interdisciplinary collaborations in order to develop the foundation for an Argentine ant IPM program in citrus. We first, identified the breadth and severity of economic and ecological damage caused by sustained invasive ant-hemipteran pest complexes in commercial citrus; second, determined the economic threshold for this ant-hemipteran associated damage in citrus; third, developed an automated infrared e-sensor to alert growers when this economic threshold is breached and treatments are warranted; fourth, investigated the efficacy of commercially available baiting products to optimize current ant control programs; fifth, developed and evaluated a novel, broadcastable, biodegradable alginate hydrogel baiting system to improve upon the efficacy, sustainability, and cost of currently used ant control technologies; and finally, extended this knowledge to end-users for implementation, converting results into realized economic benefits. The culmination of these efforts has been a significant improvement of the existing CA IPM program for invasive ants and tended pests utilizing tools that could be readily adapted for control of other tramp ants across a wide variety of ant-vulnerable cropping systems (e.g., wine grapes, nuts, etc.). As exemplified in my graduate studies, I am committed to designing and executing projects where results are not just independently useful, but can be seamlessly joined together to deliver readily implementable, 'complete package' pest management solutions to both scientists and end-users. I plan to apply this framework to other crop-pest systems as my extension career advances, collaborating with diverse interdisciplinary teams to develop both domestically and internationally successful biocontrol and IPM programs.

PRESENTATIONS

1. **Schall, K.A.** and M. Hoddle. Invasional Meltdown: Are Argentine Ants Facilitating the Invasion of Asian Citrus Psyllid (*Diaphorina citri*) (Hemiptera: Liviidae) in Southern California? Entomological Society of America Pacific Branch, Marriott University Park, AZ. 7 April 2014 (poster).
2. **Schall, K.A.** and M. Hoddle. Invasional Meltdown: Are Argentine Ants Facilitating the Invasion of Asian Citrus Psyllid in SoCal? California Association of Pest Control Advisers, Santa Paula Community Center, Santa Paula, CA. 10 Sept 2014.
3. **Schall, K.A.** and M. Hoddle. Invasional Meltdown: Are Argentine Ants Facilitating the Invasion of Asian Citrus Psyllid in SoCal? California Association of Pest Control Advisers – University of California Riverside, South Coast Winery, Temecula, CA. 17 Sept 2014.
4. **Schall, K.A.** and M. Hoddle. Invasional Meltdown: Are Argentine Ants Facilitating the Invasion of Asian Citrus Psyllid (*Diaphorina citri*) (Hemiptera: Liviidae) in Southern California? Entomological Society of America National Meeting, Oregon Convention Center, Portland, OR. 17 Nov 2014.
5. **Schall, K.A.** and M. Hoddle. Invasional Meltdown: Are Argentine Ants Facilitating the Invasion of Asian Citrus Psyllid (*Diaphorina citri*) (Hemiptera: Liviidae) in Southern California? University of California Riverside Entomology Student Seminar Day, University of California Riverside Genomics Conference Room, Riverside CA. 25 Sept 2014.
6. **Schall, K.A.** and M. Hoddle. Argentine Ants and ACP Mutualism: Determining Action Thresholds and Ant Control Strategies. Citrus Research Board Joint Agency Biocontrol Task Force, Jerry Dimitman Laboratory 1201 Research Park Drive, Riverside, CA. 4 Dec 2014.
7. **Schall, K.A.** and M. Hoddle. Argentine Ants and ACP Mutualism: Determining Action Thresholds and Ant Control Strategies. San Bernardino Asian Citrus Psyllid Task Force, National Orange Show Events Center, San Bernardino, CA. 9 Apr 2015.
8. **Schall, K.A.** and M. Hoddle. Argentine Ants and ACP Mutualism: Determining Action Thresholds and Ant Control Strategies. Citrus Research Board Joint Agency Biocontrol Task Force, California Department of Food and Agriculture Biocontrol Facility Rubidoux Conference Room Building F, Riverside, CA. 21 Apr 2015.
9. **Schall, K.A.** and M. Hoddle. Argentine ant control: Implications for Asian citrus psyllid management. California Rare Fruit Growers Inland Empire Chapter, Jurupa Mountains Discovery Center, Riverside CA. 7 May 2015.
10. Hoddle, M.S., E. Kistner, and **K. Schall**. Asian Citrus Psyllid Biocontrol in California: Updates. Citrus Research UCANR Citrus Growers Seminar Series, Santa Paula Community Center, Santa Paula, CA. 26 June 2015.
11. Hoddle, M.S., E. Kistner, and **K. Schall**. Asian Citrus Psyllid Biocontrol in California: Updates. Citrus Research UCANR Citrus Growers Seminar Series, UCR Palm Desert Center, Palm Desert, CA, 30 June 2015.
12. Hoddle, M.S., E. Kistner, and **K. Schall**. Asian Citrus Psyllid Biocontrol in California: Updates. Citrus Research UCANR Citrus Growers Seminar Series, Exeter Veterans Memorial Building, Exeter, CA, 1 July 2015.

13. **Schall, K.A.** and M. Hoddle. Argentine Ant Control: Implications for Asian Citrus Psyllid Management. Pesticide Applicators Professional Association, Marina Village Conference Center, San Diego, CA. 8 July 2015.
14. **Schall, K.A.,** J. Lara, and M. Hoddle. Biological Control in Action. Master Gardeners of Riverside Chapter, Western Municipal Water District, Moreno Valley, CA. 9 July 2015.
15. **Schall, K.A.** and M. Hoddle. An Overview of Argentine Ants in Southern California. Pesticide Applicators Professional Association, National Orange Show Events Center, San Bernardino, CA. 27 August 2015.
16. **Schall, K.A.** and M. Hoddle. An Overview of Argentine Ants in Southern California. California Association of Pest Control Advisers, Santa Paula Community Center, 530 West Main St. Santa Paula, CA. 9 Sept 2015.
17. **Schall, K.A.** and M. Hoddle. Argentine Ant Control: Implications for Asian Citrus Psyllid Management. California Asian Citrus Psyllid and Huanglongbing Research and Extension Summit, University of California Davis ARC Ballroom A, Davis, CA. 10 Sept 2015.
18. **Schall, K.A.** and M. Hoddle. Lessons from a HHS Graduate: College, Entomology, & Beyond. Heritage High School, Brentwood, CA. 11 Sept 2015.
19. **Schall, K.A.,** M. Kececi, and M. Hoddle. Comparing the Effects of Fluctuating and Constant Temperature Regimes on the Life History of the Asian Citrus Psyllid and its Parasitoid, *Tamarixia radiata*. University of California Riverside Entomology Student Seminar Day, University of California Riverside Genomics Conference Room, Riverside, CA. 17 Sept 2015.
20. **Schall, K.A.,** M. Kececi, and M. Hoddle. Comparing the Effects of Fluctuating and Constant Temperature Regimes on the Life History of the Asian Citrus Psyllid and its Parasitoid, *Tamarixia radiata*. Citrus Research Board Joint Agency Biocontrol Task Force, California Department of Food and Agriculture Biocontrol Facility Rubidoux Conference Room Building F, Riverside, CA. 24 Sept 2015.
21. **Schall, K.A.** and M. Hoddle. An Overview of Argentine Ants in Southern California. California Association of Pest Control Advisers, Victor Valley College – Performing Arts Center, Victorville, CA. 5 Nov 2015.
22. **Schall, K.A.,** M. Kececi, and M. Hoddle. Comparing the Effects of Fluctuating and Constant Temperature Regimes on the Life History of the Asian Citrus Psyllid and its Parasitoid, *Tamarixia radiata.* Entomological Society of America National Conference, Minneapolis Convention Center, Minneapolis, MN. 16 Nov 2015.
23. **Schall, K.A.** and M. Hoddle. An Overview of Argentine Ants in Southern California. Pesticide Applicators Professional Association, Fantasy Springs Resort, Indio, CA. 2 Dec 2015.
24. **Schall, K.A.,** J-W. Tay, L. Greenberg, and M. Hoddle. Fire Ant Baiting Technology in Almonds: Today and Beyond. UC Cooperative University of California Almond Integrated Pest Management Meeting, Kearney Agricultural Research and Extension Center, Parlier, CA. 7 Jan 2016.
25. Hoddle, M.S., **K. Schall**, J-W. Tay, D-H Choe, and A. Mulchandani. What is the Potential Future of Ant Control in Citrus Without Chlorpyrifos? IPM Conference: "What is the Future of Chlorpyrifos in Citrus IPM?", Tulare County UCCE Office, Tulare, CA. 12 January 2016.
26. **Schall, K.A.** and M. Hoddle. An Integrated Approach Towards Asian Citrus Psyllid Management: Ant Baiting and Biological Control. Entomological Society of America Pacific Branch, Pacific Beach Hotel, Honolulu, HI. 4 April 2016.
27. **Schall, K.A.** and M. Hoddle. Ant Baiting for Improved Biocontrol. Rare Fruit Growers of California Los Angeles Chapter, Los Angeles Arboretum – Palm Room, Arcadia, CA. 4 June 2016.
28. **Schall, K.A.** and M. Hoddle. Ant Baiting for Improved Biocontrol. California Association of Pest Control Advisers, Santa Paula Community Center, Santa Paula, CA. 9 June 2016.
29. **Schall, K.A.** and M. Hoddle. Effects Argentine Ants Have on Biocontrol Agents. Pesticide Applicators Professional Association, Riverside Convention Center, Riverside, CA. 17 Aug 2016.
30. **Schall, K.A.** and M. Hoddle. An Integrated Approach Towards Asian Citrus Psyllid Management: Ant Baiting and Biological Control. University of California Riverside Entomology Student Seminar Day, University of California Riverside Genomics Conference Room, Riverside, CA. 14 Sept 2016.
31. **Schall, K.A.** and M. Hoddle. Argentine Ant Management for Biological Control of the Asian Citrus Psyllid and Other Citrus Pests. International Congress of Entomology XXV, Orange County Convention Center, Orlando, FL. 29 Sept 2016.
32. **Schall, K.A.** and M. Hoddle. Assessing the Impact of Invasive Ant Management on Asian citrus psyllid biological control. California Asian Citrus Psyllid and Huanglongbing Research and Extension Summit, University of California Riverside Highlander Union Building, Riverside, CA. 4 Oct 2016.
33. **Schall, K.A.** and M. Hoddle. Assessing the Impact of Argentine Ant Management on Asian citrus psyllid biological control in Southern California. Annual Citrus Day for Industry, University of California Riverside Agricultural Operations, Riverside, CA. 2 Feb 2017 (poster).
34. **Schall, K.A** and M. Hoddle. Assessing the Impact of Invasive Ant Management on Asian Citrus Psyllid Biological Control. Organic Citrus Growers Annual ACP Meeting, Pala Mesa Golf Resort. Fallbrook, CA. 22 Feb 2017. Organic Citrus Growers Annual ACP Meeting, Pala Mesa Golf Resort. Fallbrook, CA. 22 Feb 2017.
35. **Schall, K.A** and M. Hoddle. An Argentine Ant Baiting System for Improved Biocontrol of Honeydew-Producing Hemipteran Pests in Southern California Commercial Citrus. Entomological Society of America Pacific Branch, DoubleTree Hotel, Portland, OR. 3 Apr 2017.
36. Milosavljevic, I., **K. Schall**, and M. Hoddle. Hoddle Lab Updates. Citrus Research Board Biocontrol Task Force, Hyatt Convention Center, Riverside, CA. 21 Apr 2017.
37. **Schall, K.A.** and M. Hoddle. Biological Control in Action: How Researchers Battle Invasive Pests. Aquarium of the Pacific Teen Science Café. Aquarium of the Pacific, Long Beach, CA. 6 Apr 2017.
38. **Schall, K.A.,** J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. Benefits of and Developments in Argentine Ant Control for Citrus. California Association of Pest Control Advisers, Azure Hotel & Suites Ontario Airport/Convention Center, Ontario, CA. 2 August 2017.
39. **Schall, K.A.,** C. Pierce, J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. An Alginate Hydrogel Baiting System for Argentine Ant Management in Citrus. University of California Riverside Entomology Student Seminar Day, University of California Riverside Entomology Courtyard, Riverside, CA. 26 Sept 2017 (poster).
40. **Schall, K.A.,** C. Pierce, J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. Developments in Argentine Ant Control for Southern California Citrus. W4185 Annual Meeting, Borrego Springs Resort, De Anza Room, Borrego Springs, CA. 4 Oct 2017.
41. **Schall, K.A.,** J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. Developments in Argentine Ant Control for Southern California Citrus. California Citrus Nursery Society Annual Conference, Embassy Suites Temecula Wine Country. Temecula, CA. 2 Nov 2017.
42. **Schall, K.A.,** J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. Assessing the Impact of Argentine Ant Management on Biological Control of Ant-Tended Hemipteran Pests in Citrus. Entomological Society of America National Meeting, Colorado Convention Center, Denver, CO. 5 Nov 2017.
43. **Schall, K.A.** and M. Hoddle. Developments in Argentine Ant Management and Implications for Biological Control of Citrus Pests. International Organization for Biological Control Meeting, Entomological Society of America National Meeting, Colorado Convention Center, Denver, CO. 7 Nov 2017.
44. **Schall, K.A.,** and M. Hoddle. Developments in Argentine Ant Management and Implications for Biological Control of Citrus Pests. Harry Scott Smith Endowed Fund in Entomology Luncheon, University of California Riverside, Riverside, CA. 17 Nov 2017.
45. **Schall, K.A.,** J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. Developments in Argentine Ant Management and Implications for Biological Control of Citrus Pests. Citrus Research Board Joint Agency ACP Biological Control Task Force, Mission Inn Spanish Art Gallery, Riverside, CA. 4 Jan 2018.
46. **Schall, K.A.,** C. Pierce, J-W. Tay, A. Mulchandani, D-H. Choe, and M. Hoddle. An Alginate Hydrogel Baiting System for Argentine Ant Management in Citrus. Annual Citrus Day for Industry, University of California Riverside Agricultural Operations, Riverside, CA. 6 Feb 2018 (poster).
47. **Schall, K.A** and M. Hoddle. Management strategies for Argentine ant in Citrus. Carlsbad Asian Citrus Psyllid Training Group, University of California Riverside Agricultural Operations, Riverside, CA. 7 Mar 2018.
48. **Schall, K.A** and M. Hoddle. Management strategies for Argentine ant in Citrus. Ag Ops Pesticide Training, University of California Riverside Agricultural Operations, Riverside, CA. 13 Mar 2018.
49. **Schall, K.A** and M. Hoddle. Management strategies for Argentine ant in Citrus. Dean's Development Advisory Board, University of California, Riverside, CA. 15 Mar 2018.
50. **Schall, K.A** and M. Hoddle. Developments in Argentine Ant Management and Implications for Biological Control of Citrus Pests. CAPCA Ed, Azure Hotel and Suites, Ontario, CA. 20 Mar 2018.

51. **Schall, K.A** and M. Hoddle. Developments in Argentine Ant Management and Implications for Biological Control of Citrus Pests. CAPCA 2nd Spring Summit, Pechanga Resort, Temecula, CA. 25 Apr 2018.
52. **Schall, K.A.** and M.S. Hoddle. Ant management in support of ACP biological control in citrus. Joint Agency Biological Control Taskforce Meeting, Marriott Riverside, CA. 31 July 2018.
53. **Schall, K.A.** and M.S. Hoddle. Developments in Argentine ant Management and Implications for Biological Control of Citrus Pests. CAPCA Ed., Rancho Santa Susana Community Center, Simi Valley, CA. 16 Aug 2018.

PUBLICATIONS

Schall, K.A. and M.S. Hoddle, 2017. Disrupting the Ultimate Invasive Pest Partnership. Citrograph 8: 38-43.

Schall, K.A. and M.S. Hoddle, 2017. The Pest Partnerships that Threaten Citrus. Citrus Industry 98: 28-31.

Milosavljevic, I., K.A. Schall, C.D. Hoddle, D.J.W. Morgan, and M.S. Hoddle, 2017. Biocontrol Program Targets Asian Citrus Psyllid in California's Urban Areas. California Agriculture 71: 169-177.

Schall, K.A., J-W Tay, A. Mulchandani, D-H. Choe, and M.S. Hoddle, 2018. Harnessing Hydrogels in the Battle Against Invasive Ants. Citrograph 9: 30-35.

Milosavljević, I., K.A. McCalla (Schall), D.A. Ratkowsky, and M.S. Hoddle. 2019 (in press). Effects of Constant and Fluctuating Temperatures on Development Rates and Longevity of *Diaphorencyrtus aligarhensis*. Journal of Economic Entomology.

McCalla (Schall), K.A., I. Milosavljevic, M. Kececi, D.A. Ratkowsky, and M.S. Hoddle. 2019 (submitted). The influence of temperature variation on life history parameters and thermal performance curves of *Tamarixia radiata*, a parasitoid of the Asian citrus psyllid*, Diaphorina citri*. Journal of Economic Entomology.

McCalla (Schall), K.A., J.W. Tay, D.H. Choe, M.S. Mulchandani, and M.S. Hoddle (in prep). Evaluation of a novel biodegradable hydrogel bait delivery system for control of invasive hemipteran-tending ants in commercial citrus.

MEDIA FEATURES

Muckenfuss, M., 2016. Why Researchers Say Killing Ants May be Key to Saving California's Citrus Industry. The Press Enterprise. Accessed 5 Oct 2016, https://shar.es/1Eyylp. Accessed 17 Oct 2016.

Milosavljevic, I., K. A. Schall, and M. S. Hoddle, 2017. Classical Biological Control of Asian Citrus Psyllid, *Diaphorina citri* (Hemiptera: Liviidae), in California. Applied Biological Control Research. Accessed 1 Apr 2017, http://biocontrol.ucr.edu/asian_citrus_psyllid.html

Crown City News Network. Crown City News Spotlight: University of California Riverside Bug Fair. YouTube. Accessed 21 June 2017, https://www.youtube.com/watch?v=J5tGPNQHNho

ABC7 KABC-TV. Fourth Annual Riverside Insect Fair. Aired on 27 April 2018.

HONORS, AWARDS, AND CERTIFICATIONS

2009	Regents Scholarship, UCSB
2013	Chancellor's Fellowship, UCR
2013	GradEdge Summer Program, UCR
2015	Herbert Kraft Endowed Scholarship, UCR
2015	2nd Place Presentation, Student Seminar Day Competition, UCR
2015	1st Place Presidents Prize, 10-Minute Paper Presentation Competition, ESA National, Minneapolis, MN
2016	Travel Grant ESA, Pacific Branch Conference, Honolulu, HI
2016	2nd Place Presentation, 10-Minute Paper Presentation Competition, ESA Pacific Branch, Honolulu, HI
2016	Graduate Research Mentorship Fellowship, UCR
2016	Harry Scott Smith Biological Control Scholarship, UCR
2016	Ernest Propes Endowed Graduate Fellowship, UCR
2017	Charles W. Coggins Jr. Endowed Scholarship, UCR
2017	Robert and Peggy van den Bosch Scholarship, UCR
2017	UCR Entomology Graduate Student Association Member of the Year, UCR
2017	International Organization for Biological Control Robert O'Neil Award for Outstanding Ph.D. Student
2017	2nd Place Poster, Student Seminar Day Competition, UCR
2017	2nd Place Presentation, 10-Minute Paper Presentation Competition, ESA National, Denver, CO

PROFESSIONAL SERVICE

2013-2018 Mentoring	Mentored nine minority UCR undergraduate students through independent and cooperative research projects (conservation and integrated pest management in citrus), writing (e.g., reports, fellowship and award applications, undergraduate academic journals, etc.) and academic presentations, facilitating development of critical academic and professional skills. Most students have attended post-secondary schooling (e.g., medical and veterinary school, Ph.D. programs) or successfully acquired IPM research positions in government organizations or public universities.
2014-2015 EGSA Outreach Coordinator	Served as Outreach Coordinator for the UCR Entomology Graduate Student Association (EGSA). Volunteered over 200 hours. Responsibilities included outreach event organization and communication, transportation, set-up, clean-up, outreach insect colony care, and interactive presentation of research and insects to children, teens, and adults.
2015-2018 EGSA Fundraising and Events Committee Chair	Served as Fundraising and Events Committee Chair and as member of treasury and merchandise committees in EGSA. For 4 years, planned and executed EGSA's largest fundraising and educational events: the UCR Entomology Craft Fair and the Riverside Insect Fair. The latter is a family-focused event held in collaboration with the Riverside Metropolitan Museum, and City of Riverside. We also partner with major educational organizations such as the San Diego and the Living Desert Museum. The event typically features 60+ vendor, educational, and general public friendly research booths, boasting participation by nearly all UCR Entomology Department labs and including some interdepartmental participants. In 2018, this event netted an estimated 14,000+ visitors both enthusiasts and community members from all across California. Primary responsibilities include event planning (supply purchase and preparation, outreach insect purchase and care, vendor and volunteer searching and organization, permit/documentation acquisition and management, handling of finances, collaborator communications, etc.), advertising (sponsor and crowd-sourced funding), and event execution (set-up, clean-up, and during-event coordination), and debriefing (finance, surveys, performance, and attendance review).
2016 Symposium Moderator	Moderated seminar session "Contributed Papers: Biological Control and Insect Pathology: Unique Studies II" at the International Congress of Entomology XXV, Orlando, FL.
2016 Teaching; Guest Lecturer	Teaching assistant for 150 students enrolled in Entomology 10, A Natural History of Insects, at UCR. Responsibilities include material preparation, teaching sections and lectures, proctoring exams, and grading.
2019 Symposium Organizer and Moderator	Organizer and moderator for session "Innovative Technologies and Methods in Insect Pest Management" at the 2019 Entomological Society of America Pacific Branch Conference, San Diego, CA. The goal of this session is to provide an overview of cutting-edge technologies currently in use or under development for monitoring and control of economically important insect pests in agriculture and foster interdepartmental communication and collaboration on technology-focused projects.