

## **Gregory Loeb, Principal Investigator**

Professor of Entomology

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### **EDUCATION:**

B.S.	Univ of California, Davis, CA	1977
M.S.	San Diego State University, San Diego, CA	1982
Ph.D.	University of California, Davis, CA	1989

### **PROFESSIONAL EXPERIENCE:**

1991-1992	NSF Postdoctoral Fellow in Environ. Biology, Stanford Univ.
1989-1991,	Postdoctoral Research Associate, Department of Entomology,
1992-1994	University of California, Davis, CA
1993	Lecturer, University of California, Davis, CA
1995-2001	Assistant Professor, Department of Entomology, Cornell University, NYS Agricultural Experiment Station, Geneva, NY
2001-2008	Associate Professor. Dept. Entomology, Cornell University, NYS Agricultural Experiment Station, Geneva, NY
2008-Present	Professor, Department of Entomology, Cornell University, NYS Agricultural Experiment Station, Geneva, NY

### **PROFESSIONAL SOCIETIES/SERVICE:**

Entomological Society of America

### **HONORS AND AWARDS:**

1991-1992	NSF Postdoctoral Fellow
1997	American Society for Enology and Viticulture, best paper of the year published in American Journal of Enology & Viticulture in 1997 (co-author)
2010	Excellence in IPM Award from the NYS IPM Program
2010	NY Wine & Grape Foundation Research Award for major contributions
2016	Entomological Society of America Award for Excellence in Integrated Pest Management
2017	Cornell College of Agriculture and Life Sciences, Outstanding Accomplishments in Research Award

### **DIVISION OF EFFORT:**

Research - 60% - Ecology and management of arthropod pests of small fruits & grapes

Extension - 30% - Grapes and small fruit

Teaching - 10% - Grape Pest Management

## AREAS OF EXPERTISE:

Insect ecology, integrated pest management, biological control, agricultural entomology

## ACTIVE GRANT SUPPORT:

- **Loeb (PI):** Federal Capacity Funds Initiative #2018-19-155, Discovery & Use of Repellents & Attractants for Managing Spotted Wing Drosophila.
- **Loeb (PI):** Federal Capacity Funds Initiative #2019-20-217, Biological control of two-spotted spider mite (*Tetranychus urticae*) and tarnished plant bug (*Lygus lineolaris*) on low tunnel strawberry in New York.
- **Loeb (Co-PI)/Scott (PI):** Federal Capacity Funds Initiative #2019-20-203, Monitoring Insecticide Resistance in *Drosophila melanogaster* and Development of Countermeasures
- **Loeb (Co-PI)/Douglas (PI)/Raguso:** Federal Capacity Funds Initiative #2018-19-244, Designing an Effective Field Trap for Spotted Wing Drosophila Pests.
- **Loeb (Co-PI)/Burrack (PI) et al.:** USDA Specialty Crops Research Initiative, Developing & Implementing Sustainable Strategies to Manage Spotted Wing Drosophila in United States Fruit Crops.
- **Loeb (Co-PI)/Scott (PI).** NYS Wine and Grape Foundation, Insecticide resistance is limiting control of sour rot in NY vineyards.
- **Loeb (Co-PI)/Weber (PI)/Pritts/Cox/Gomez/Carroll:** NYS Dept. of Agric. & Markets #C00247GG, Cornell Berry Research.
- **Loeb (Co-PI)/Buchon (PI):** NYS Dept. Ag & Markets, Towards Biological Control of SWD Using Bacterial or Fungal Pathogens.
- **Loeb (Co-PI)/Fuchs (PI), Douglas (Co-PI):** American Vineyard Foundation/C DFA, Resistance to grapevine leafroll-associated virus 3 and the grape mealybug.
- **Loeb (Co-PI)/Fuchs (PI):** Federal Capacity Funds Initiative #2018-19-256, Integrated Management of Leafroll Disease in Vineyards.
- **Loeb (PI)/Cox:** Federal Formula Funds Initiative, Molecular and behavioral effects of *Erwinia amulovora* on apple trees and insect vectors commonly found in apple orchards.
- **Loeb (PI)/Willden:** Northeast SARE Grad Student Grant #GNE18-191-32231, Low Tunnel Strawberries: Survey of Pest Incidence & Recommendations for Biological Control of Two-Spotted Spider Mite.

## INVITED PRESENTATIONS (PAST 4 YEARS):

2018. Excluding *Drosophila suzukii* from NY raspberries and blueberries using netting. A contribution as part of a symposium organized by W. Hamilton titled “Multistate research collaborations accelerate solutions to spotted wing drosophila *Drosophila suzukii* management”, at the 2018 ESA annual meeting held in Vancouver, Canada.
2018. How do you solve a problem like spotted wing drosophila? Invited seminar speaker at University of Massachusetts Stockbridge School of Agricultural on 22 October 2018.
2018. How do you solve a problem like spotted wing drosophila? Invited seminar speaker at USDA ARS US Pacific Basin Agricultural Research Center, Hilo, HI, on 11 January 2018.

2017. Progress on the discovery and use of attractants and repellents for managing *Drosophila suzukii*. A contribution as part of a symposium organized by D. Cha and P. Witzgal, titled “Fruit Flies: From Model to Management”, at the 2017 ESA annual meeting held 7 November 2017 in Denver Co.
2016. How do you solve a problem like spotted wing drosophila. Invited seminar speaker for Section of Plant Pathology and Plant-Microbe Interactions, Cornell University, NYSAES, Geneva, on 22 November 2016 in Geneva, NY.
2016. *Drosophila suzukii* alternate host and spatial distribution and improvement of pesticide efficacy, as part of symposium entitled “International perspectives contribute toward a clearer understanding of *Drosophila suzukii*” organized by V. Walton, G. Anfora, N. Wiman, and Ash Sia at the 2016 International Congress of Entomology in Orlando, Fl.

### **PUBLICATIONS (2015-PRESENT):**

2019. Cloonan, K.R, Hernández-Cumplido, J., Viana de Sousa, A.L., Ramalho, D.G., Burrack, H.J, Diepenbrock, L.M, Drummond, F.A., Gut, L.J., Issacs, R, Loeb, G.M, Nielsen. A.L, Nitzsche, P., Syed, Z., Wallingford, A.K.1, Walton, V.M., and Rodriguez-Saona, C. Laboratory and field evaluation of host-related foraging odor cue combinations to attract *Drosophila suzukii* (Diptera: Drosophilidae). *J Economic Entomology*, In Press.
2019. Barta, P., Loughner, R., Wentworth, K., Hyma, K., Nyrop, J.P., **Loeb, G.M.**, and Reisch, B.I. A genetic locus associated with abundance of the predatory mite *Typhlodromus pyri* has a major influence on leaf trichome traits in grapevines. *Horticulture Research*, In Press.
2019. Boucher, M., Collins, R., Cox, K., and **Loeb, G.** 2019. Effects of exposure time and biological state on acquisition and accumulation of *Erwinia amylovora* by *Drosophila melanogaster*. *Applied & Environmental Microbiology*, In Press.
2019. Stockton, D., Brown, R., and **Loeb, G.** 2019. Not very hungry? Discovering the hidden food sources of a small fruit specialist, *Drosophila suzukii*. *Ecological Entomology*, DOI: 10.1111/een.12766.
2019. Triapitsyn, S. V., D. A. Dmitriev & **G. M. Loeb**. Identities of the leafhoppers collected from cultivated and wild grapes (*Vitis* spp.) in Upstate New York, USA (Hemiptera: Cicadellidae). *Entomologica Americana* 124 (1-4): 24-25.
2019. Grab, H., Brokaw, J., Anderson, El, Gedlinski, L., Gibbs, J., Wilson, J., **Loeb, G.**, Poveda, K., Isaacs, R. Habitat enhancements rescue bee body size from the negative effects of landscape simplification. *J Applied Ecology*, doi: 10.1111/1365-2664.13456.
2019. Cha, D.H., Hesler, S.P., Brind’Amour, G., Wentworth, K., Villani, S., Cox, K., Boucher, M., Wallingford, A., Park, S., Nyrop, J., and **Loeb, G.** Evidence for contextural avoidance of the ubiquitous phytopathogen *Botrytis cinerea* by *Drosophila suzukii*. *Insect Science* DOI: 10.1111/1744-7917.12691.
2019. Sun, H., Loeb, G.M., Walter-Peterson, H., Martinson, T.E., and Scott, J.G. Insecticide Resistance in *Drosophila melanogaster* Results in Field Control Failure of Sour Rot Disease in a New York Vineyard. *Journal Economic Entomology*, [doi.org/10.1093/jee/toz039](https://doi.org/10.1093/jee/toz039)

2019. Rendon, D., Walton, V., Tait, G., Buser, J., Lemos Souza, I., Wallingford, A. **Loeb, G.**, and Lee, J. Interactions among morphotype, nutrition, and temperature impact fitness of an invasive fly. *Ecology and Evolution*, DOI:10.1002/ece3.4928.
2019. Grab, H., Branstetter, M.G., Amon, N., Urban-Mead, K., Park, M.G., Gibbs, J., Blitzer, E.J., Poveda, K., **Loeb, G.**, and Danforth, B.N. Agriculturally dominated landscapes reduce bee phylogenetic diversity and pollination services. *Science* 363: 282-284.
2019. Wolfen, M.S., Volo, S.L., Chilson R.R., Liu, Y., Cha, D.H., Cox, K.D., **Loeb, G.**, Linn, C.E. Plants, microorganisms and odorants involved in insect host plant location: who's making the message? *Entomologia experimentalis et applicata*, In Press.
2019. Stockton, D., Wallingford, A., Rendon, D., Fanning, P., Green, C., Diepenbrock, L., Ballman, E., Walton, V., Isaacs, R., Leach, H., Drummond, F., Burrack, H., & **Loeb, G.** Overwintering success of spotted wing drosophila: A multi-state field trial. *Environmental Entomology*, DOI: 10.1093/ee/nvy192.
2018. Stockton, D.G., Wallingford, A.K., and **Loeb, G.M.** Phenotypic plasticity promotes overwintering survival in a globally invasive crop pest, *Drosophila suzukii*. *Insects* doi:10.3390/insects9030105.
2018. Wallingford, A.K., Rice, K.B., Leskey, T.C., and **Loeb, G.M.** Overwintering behavior of *Drosophila suzukii* Matsumura, and potential springtime diets for egg maturation. *Environmental Entomology* doi:10.1093/ee/nvy115.
2018. Grab, H., Poveda, K., Danforth, B., and **Loeb, G.** Landscape context shifts the balance of costs and benefits from wildflower borders on multiple ecosystem services. *Proceedings of the Royal Society of London B* 285: 20181102, <http://dx.doi.org/10.1098/rspb.2018.1102>.
2018. Hall, M.E., **Loeb, G.M.**, Cadle-Davidson, L., Evans, K.J., and Wilcox, W.F. 2018. Grape sour rot: a four-way interaction involving the host, yeast, acetic acid bacteria, and insects. *Phytopathology*, doi.org/10.1094/PHYTO-03-18-0098-R.
2018. Hall, M.E., **Loeb, G.M.**, and Wilcox, W.F. Control of sour rot via chemical and canopy management techniques. *American Journal of Enology and Viticulture*. doi: 10.5344/ajev.2018.17091
2018. Cha, D.H., **Loeb, G.M.**, Linn, C.E., Hesler, S.P., and Landolt, P.J. A multiple-choice bioassay approach for rapid screening of key attractant volatiles. *Environmental Entomology*, DOI: 10.1093/ee/nvy054.
2018. Bing, X., Gerlach, J., **Loeb, G.** and Buchon, N. Nutrient-dependent impact of gut microbes on *Drosophila suzukii* development. *mBio*, , doi: 10.1128/mBio.02199-17.
2018. Elsensohn, J. and **Loeb, G. M.** 2018. Non-crop host sampling yields insights into small-scale population dynamics of *Drosophila suzukii* (Matsumura). *Insects* 9:5; doi: 10.3390/insects9010005.
2018. Wong, J., Wallingford, A., **Loeb, G.**, and Lee, J. Physiological status of *Drosophila suzukii* (Diptera: Drosophilidae) affects their response to attractive odors. *Journal of Applied Entomology*, doi.org/10.1111/jen.12497.
2018. Cha, D.H., Hesler, S., Wallingford, A., Zaman, F., Jentsch, P., Nyrop, J., and **Loeb, G.** Comparison of commercial lures and food baits for early detection of fruit infestation risk by *Drosophila suzukii*. *Journal of Economic Entomology* doi: 10.1093/jee/tox369
2018. Grab, H., Danforth, B., Poveda, K., and **Loeb, G.** Landscape influences classical biological control and crop yield. *Ecological Applications*, DOI: 10.1002/eap.1651.

2017. Bost, A., Franzenburg, S. Adair, K., Martinson, V.G., **Loeb, G.**, and Douglas, A. E. How gut transcriptional function of *Drosophila melanogaster* varies with presence and composition of the gut microbiota. *Microbial Ecology*, DOI:10.1111/mec.14413.
2017. Cieniewicz, E.J., Pethybridge, S.J., **Loeb, G.**, Perry, K.L., and Fuchs, M.F. Insights into the ecology of grapevine red blotch virus in a diseased vineyard. *Phytopathology* 108: 94-102, doi:org/10.1094/phyto-07-17-0239-R.
2017. McCabe, E., **Loeb, G.**, and Grab, H. Responses of crop pests and natural enemies to wildflower borders depends on functional group. *Insects* 8: 73, doi:[10.3390/insects8030073](https://doi.org/10.3390/insects8030073)
2017. Wallingford, A.K., Cha, D.H., and **Loeb, G.** Evaluating a push-pull strategy for management of *Drosophila suzukii* Matsumura in red raspberries. *Pest Management Science* 74: 120-125, DOI: 10.1002/ps.4666.
2017. Wallingford, A.K., Cha, D.H., Linn, C.E., Wolfen, M., and **Loeb, G.** Robust manipulations of pest insect behavior using repellents and practical application for integrated pest management. *Environmental Entomology* 46: 1041-1050, doi: 10.1093/ee/nvx125.
2017. Fraimout, A., Debat, V., Fellous, S., Hufbauer, R.A., Foucaud, J., Pudlo, P., Marin, J., Price, D.K., Cattell, J., Chen, X., Drpra, M., Byyck, P., Guedot, C., Kenis, M., Kimura, M.T., **Loeb, G.**, Loiseau, A., Martinez-Sanudo, I., Pascual, M., Richond, M., hearer, P., Singh, N., Tamura, K., Xuyereb, A., Zhang, J., and Estoup, A. Deciphering the routes of invasion of *Drosophila suzuki* by means of abc random forest. *Molecular Biology Evolution* 34: 980-996, doi:10.1093/molbev/msx050.
2017. Grab, H., Blitzer, E.J., **Loeb, G.**, Danforth, B., and Poveda, K. Temporally mediated pollinator competition and facilitation with mass flowering crops affects yield in co-blooming crops. *Scientific Reports* 7:45296, DOI: 10.1038/srep45296.
2016. Wallingford, A. and **Loeb, G.M.** Developmental acclimation of *Drosophila suzukii* and its effect on diapause and winter stress tolerance. *Environmental Entomology*, DOI: 10.1093/ee/nvw088.
2016. Wallingford, A., Connelly, H.L, Brind'Amour, G., Boucher, M., T., Mafra-Neto, A., and **Loeb, G.M.** Field evaluation of an oviposition deterrent for management of spotted wing drosophila, *Drosophila suzukii* Matsumura, and potential non-target effects. *Journal of Economic Entomology*, 109: 1779-1784. DOI: 10.1093/jee/tow116.
2016. Wallingford, A., Lee, J, **Loeb, G.** The influence of temperature and photoperiod on the reproductive diapause and cold tolerance of spotted-wing drosophila, *Drosophila suzukii* (Matsumura). *Entomologia Experimentalis et Applicata*, 159: 327-337. DOI: 10.1093/jee/tow116.
2016. Renauld, M., Hutchinson, A., **Loeb, G.**, Poveda, K., and Connelly, H. Landscape simplification constrains adult size in a native ground-nesting bee. *Plos One*, doi: 10.5061/dryad.kr577.
2015. Pozzebon, A., **Loeb, G.M.**, and Duso, C. Role of supplemental foods and habitat structural complexity in persistence and coexistence of generalist predatory mites. *Scientific Reports* 5, 14997; doi: 10.1038/srep14997.
2015. Wallingford, A.K., Fuchs, M.F., Martinsion, T., Hesler, S., and **Loeb, G.M.** Slowing the spread of grapevine leafroll-associated viruses in commercial vineyards with insecticide control of the vector, *Pseudococcus maritimus* (Erhorn) (Hemiptera: Pseudococcidae). *Journal of Insect Science*, In Press.

2015. Connelly, H., Poveda, K., and **Loeb, G.** Landscape simplification negatively affects wild bee pollination services to strawberry. *Agriculture, Ecosystems and the Environment*, 211: 51-56.
2015. Wallingford, A.K., Hesler, S.P., Cha, D.H., and **Loeb, G.M.** Behavioral response of spotted wing drosophila, *Drosophila suzukii* Matsumura, to aversive odors and a potential oviposition deterrent in the field. *Pest Management Science*, In Press.
2015. Fuchs, M. Marsella-Herrick, P., Hesler, S., Martinson, T., and **Loeb, G.** Seasonal pattern of virus acquisition by the grape mealybug, *Pseudococcus maritimus* (Erhorn), in a leafroll-diseased vineyard. *Journal of Plant Pathology*, In Press. .
2015. Agnello, A., Landers, A., and **Loeb, G.** A fixed-spray system for spotted wing drosophila management in high tunnel bramble crops. *Journal of Berry Research* 5: 81-88.
2015. Burrack, H.J., Asplen, M., Bahder, L., Collins, J., Drummond, F.A., Guedot, C., Isaacs, R., Johnson, D., Banton, A., Lee, J.C., **Loeb, G.**, Rodriguez-Saona, C., Van Timmeren, S., Walsh, D., and McPhie, D.R. 2015. Multi-state comparison of attractants for monitoring *Drosophila suzukii* (Diptera: Drosophilidae) in blueberries and caneberries. *Environmental Entomology*, In Press.
2015. Cowles, R.S, Rodriguez-Saona, C., Holdcraft, R., **Loeb, G.M.**, Elsensohn, J.E., and Hesler, S.P. 2015. Sucrose improves insecticide activity against *Drosophila suzukii* (Diptera: Drosophilidae), *Journal of Economic Entomology* 108: 640-653.
2015. Cha, D.H., Hesler, S.P., Park, S.Y., Adams, T., Zack, R., Rogg, H., **Loeb, G.M.**, Landolt, P.J. Simpler is better: fewer nontarget insects trapped with a 4-component synthetic lure versus a chemically complex food-type bait for *Drosophila suzukii*. *Entomologia Experimentalis et Applicata* 154: 251-260.

**EXTENSION PUBLICATIONS (PAST 3 YEARS):**

2019. Loeb, G. Grape insect and mite pests 2019 field season. Lake Erie Regional Grape Program, Vineyard Notes, June 2019
2019. Stockton, D., Hesler, S., and Loeb, G., McDermott, L., and Riggs, D.I. Spotted wing drosophila control using exclusion netting. NYS Berry News, Spring 2019.
2019. Willden, S. and Loeb, G. Management of mites and other pests of strawberries grown under low tunnels. NYS Berry News, Winter 2019.
2018. Loeb, G. Grape insect and mite pests-2018 field season. Lake Erie Regional Grape Program, Vineyard Notes, May 2018.
2018. Loeb, G., Hesler, S., Stockton, D., and Willden, S. Entomology 2017 research update: new approaches to managing spotted wing drosophila and biological control of spider mites on low tunnel strawberries. NYS Berry News, Spring 2018.
2017. Wallingford, A, Elsensohn, J., Swododa-Bhattarai, Burrack, H., and Loeb, G. Local populations of spotted wing drosophila in wild host plants. NYS Berry Growers Association newsletter, Issue 1, April 2017, Pages 1-3.
2016. Wallingford, A. and Loeb, G. Spotted wing drosophila winter biology. NY Fruit Quarterly. NY Fruit Quarterly 24 (3): 11-13.
2016. Riggs, D., Loeb, G., Hesler, S., and McDermott, L. Using insect netting on existing bird netting support systems to exclude spotted wing drosophila (SWD) from a small scale

- commercial highbush blueberry planting. *NY Fruit Quarterly* 24: 9-14.
2016. Boucher, M., Cox, K., and Loeb, G. The role of insects in spreading fire blight in apples. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 2-3.
2016. Hesler, S., Loeb, G., Cha, D., Jentsch, P., Zamen, F., Carroll, J., and Nyrop, P. Monitoring spotted wing drosophila for management decisions in summer raspberry and blueberry crops. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 14-15.
2016. Loeb, G., Riggs, D., McDermott, and Hesler, S. Use of exclusion netting for managing spotted wing drosophila in fall raspberries. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 16-17.
2016. Loeb, G., Fuchs, M., and Gomez, M. Managing the spread of leafroll virus in vinifera grapes using insecticides and vine removal. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 17-18.
2016. Wallingford, A. and Loeb, G. A potential push/pull strategy for managing spotted wing drosophila in red raspberry. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 26.
2016. Grab, H., Poveda, K., Danforth, B. and Loeb, G. (speaker) Managing farms and landscapes for both biological control and pollination services. Proceedings summary for the Cornell Fruit Field Day held on 20 July 2016. Pp 13-14.
2016. Fraver, C., and Loeb, G. Can monitoring of adult swd provide sufficient advanced warning? *NYS Berry Growers Association Newsletter*, 2016 Issue 1, March 2016, p 1 -3.
2016. Wallingford, A., and Loeb, G. Spotted wing drosophila winter biology. *NYS Berry Growers Association Newsletter*, 2016 Issue 2, April 2016, p 1 -3.
2016. Loeb, G. Grape insect and mite pests – 2016 field season. *Lake Erie Regional Grape Program Vineyard Notes*, 18 May 2016. Pp 3-23.
2016. Loeb, G. Spotted wing drosophila: when do I really need to start spraying? Proceedings of the 2016 Mid-Atlantic Fruit & Vegetable Convention, Hershey PA, pg 137.
2016. Loeb, G. Strategies to control arthropod pests in high tunnels. Proceedings of the 2016 Empire State Fruit and Vegetable Expo, held in Syracuse, NY, 19-21 January 2016. <http://www.hort.cornell.edu/expo/proceedings/2016/Berry.Strategies%20to%20control%20arthropod%20pests%20in%20high%20tunnels.Loeb.pdf>.
- 2015 Loeb, G., Walton, V., and Zalom, F. Mites. In: Wilcox, W., Gubler, W., & Uyemoto, J. (eds), *Compendium of grape diseases, disorders, and pests*, 2<sup>nd</sup> Edition. APS Press, St. Paul, MN