

Fábio Miguel Führ

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EDUCATION

PhD in Entomology

Texas A&M University

Dissertation: To be defined.

August 2024 – Present

M.Sc. in Entomology

Luiz de Queiroz College of Agriculture, University of São Paulo (ESALQ/USP)

Thesis: Characterization of *Helicoverpa armigera* (Lepidoptera: Noctuidae) resistance to chlorantraniliprole and evaluation of the mixture with *Bacillus thuringiensis* (Eubacteriales: Bacillaceae) as a resistance management strategy.

March 2021 – April 2023

B.S. in Agronomy Engineering

Federal University of Santa Maria (UFSM)

Thesis: Lethal and sublethal effects of the baculovirus-based insecticide Chrysogen® containing *Chrysodeixis includens* nucleopolyhedrovirus on soybean looper.

August 2013 – January 2020

Bachelor exchange scholar in plant protection

Nacional University of the Litoral (UNL).

March 2018 – July 2018

RESEARCH AND WORK EXPERIENCE

Graduate Research Assistant

David Kerns Lab., Department of Entomology, Texas A&M University

Dissertation title: To be defined.

Activities: Understanding the outbreak of Corn Leaf Hopper (*Dalbulus maidis*) in Texas and the survival of Southwest Corn Borer (*Diatraea grandiosella*) in Bt corn hybrids in New Mexico to development management strategies.

Reference: Dr. David Kerns, Statewide IPM Coordinator at Texas AgriLife Extension, E-mail: david.kerns@ag.tamu.edu

August 2024 – Present

Research Specialist

Robert Koch Lab., Department of Entomology, University of Minnesota (UMN)

Project title: Evaluating control methods for a new leaf-mining pest of soybean in Minnesota

Activities: Development of activities related to Insect Pest Management (IPM) in soybeans. Understand the biology, the spatial distribution within field/plant, the spatial distribution in Minnesota fields, the host preference, the parasitoids associated and evaluating control methods of *Macrossacus morrisella*, a new soybean pest in US.

Reference: Dr. Robert Koch, Leader of UMN Extension's Institute for Ag Professionals, E-mail: koch0123@umn.edu

April 2023 – May 2024

Graduate Research Assistant

Arthropod Resistance Lab., Department of Entomology, Luiz de Queiroz College of Agriculture (ESAL/USP)

Project title: Characterization of *Helicoverpa armigera* (Lepidoptera: Noctuidae) resistance to chlorantraniliprole and evaluation of the mixture with *Bacillus thuringiensis* (Eubacteriales: Bacillaceae) as a resistance management strategy

Activities: Development of activities related to Insect Resistance Management (IRM) to insecticides. Rearing of insects (*Helicoverpa armigera*, *Spodoptera frugiperda*, *Podisus nigrispinus* and *Dalbulus maidis*);

March 2021– April 2023

collection of field insects in different regions for insecticide susceptibility assays; selection of insecticide-resistant individuals; field trials (Insecticide efficacy of foliar sprays and seed treatment); evaluation of mixture of active ingredients.

Reference: Dr. Celso Omoto, Professor at ESALQ/USP, E-mail: celso.omoto@usp.br

Intern Research

January 2020 – December 2020

FMC Quimica do Brasil Ltda., Latin America Research, Development and Innovation Center (Paulínia/SP)

Activities: Assistance in the implementation and conduction of experiments for developing new pesticides and biological control agents; assistance in the application and evaluation of field trials; organization and development of new test methodologies; assistance in activities related to fungicide resistance monitoring.

Reference: Dr. Vanessa Cristina Frare, Researcher at FMC, E-mail: vanessa.frare@fmc.com

Dr. Mariana Durigan, Agronomic solution manager- pest management at Bayer

Dr. Fabio Silva, Latin America Technical Insecticide Manager at FMC, E-mail: fabio.silva2@fmc.com

Lab Technician

August 2018 – March 2021

Insect Resistance Research Group, Department of Entomology, Federal University of Santa Maria (UFSM)

Activities: Development of activities related to Insect Resistance Management (IRM) to *Bacillus thuringiensis* (Bt) and insecticides. Rearing of insects (*Spodoptera* sp., *Chrysodeixis includens*, *Euschistus heros* and *Nezara viridula*); collection of insect pests; laboratory assays to characterize insect susceptibility to insecticides, viruses, and Bt toxins; selection of insecticide-resistant individuals; field trials (Insecticide residual and efficacy); elaboration of IRM strategies.

Reference: Dr. Oderlei Bernardi, Professor at UFSM, E-mail: oderleibernardi@yahoo.com.br

Student Worker

March 2018 – July 2018

Plant Center Sillon & Associates (UNL/Argentina), Esperanza, Santa Fé

Activities: Assistance in the implementation, evaluation, and sampling of pathogens trials in soybean and wheat fields.

Reference: Dr. Margarita Sillon, Professor at UNL, E-mail: margaritasillon@arnet.com.ar

Intern Researcher

March 2013 – August 2013

Activities: Responsible for implementation, conduction and data collection, as well as for the maintenance of the field trials both in annuals and fruit crops.

References: M.Sc. Paulo Vitor Campos, Manager at RiceTec Seeds, E-mail: pcampos@ricetec-sa.com. M. Sc Gustavo Spreckelsen Casagrande, Research and Development Technician at Andermatt Iberia S.L., E-mail: gustavospreckelsen@hotmail.com

PEER-REVIEWED PUBLICATIONS

1. **Führ, F.M.**; Ribeiro, A.V.; Menger, J.P.; Koch, R.L. Potential for chemical control of the soybean tentiform leafminer (Lepidoptera: Gracillariidae), a new pest of soybean. *Journal of Economic Entomology*, 2024, toae249.
2. Menger, J.P.; Ribeiro, A.V.; **Führ, F.M.**; Koch, R.L. Laboratory rearing methods for the soybean tentiform leafminer (Lepidoptera: Gracillariidae), a new pest of soybean. *The Great Lakes Entomologist*, 2024, 57(1): 63-68.
3. Ribeiro, A.V.; Menger, J.P.; **Führ, F.M.**; Koch, R.L. Immature development and adult longevity of the soybean tentiform leafminer, *Macrosaccus morrisella* (Lepidoptera: Gracillariidae). *Environmental Entomology*, 2024, 53(4): 723–729.
4. Machado, E.P.; Garlet, C.G.; Weschenfelder, M.A.G.; **Führ, F.M.**; Godoy, D.N.; Pretto, V.E.; Contini, R.E.; Franco, C.R.; Omoto, C.; Bernardi, O. Interspecific Variation in Susceptibility to Insecticides by Lepidopteran Pests of Soybean, Cotton, and Maize Crops From Brazil. *Journal of Economic Entomology*, 2022, 115(1):305-312.
5. **Führ, F.M.**; Pretto, V.E.; Godoy, D.N.; Garlet, C.G.; Hettwer, B.L.; Marçon, P.; Popham, H.J.R.; Bernardi, O. Lethal and sublethal effects of *Chrysodeixis includens* nucleopolyhedrovirus (ChinNPV)-based biopesticide infecting different larval ages of soybean looper. *Biocontrol Science and Technology*, 2021, 31(6):619-631.

6. Somavilla, J.C.; Gubiani, P.S.; Reis, A.C.; **Führ, F.M.**; Machado, E.P.; Bernardi, O. Susceptibility of *Euschistus heros* and *Dichelops furcatus* (Hemiptera: Pentatomidae) to insecticides determined from tropical bioassays and diagnostic doses for resistance monitoring of *E. heros* in Brazil. *Crop Protection*, 2020, 138(1):105319.
7. Machado, E.P.; Rodrigues, G.L.S.; Somavilla, J.C.; **Führ, F.M.**; Zago, S.L.; Marques, L.H.; Santos, A.C.; Nowatzi, T.; Dahmer, M.L.; Omoto, C.; Bernardi, O. Survival and development of *Spodoptera eridania*, *Spodoptera cosmioides* and *Spodoptera albula* (Lepidoptera: Noctuidae) on genetically-modified soybean expressing *Cry1Ac* and *Cry1F* proteins. *Pest Management Science*, 2020, 76(1):4029-4035.
8. Stacke, R.F.; Godoy, D.N.; Pretto, V.E.; **Führ, F.M.**; Gubiani, P.S.; Hettwer, B.L.; Garlet, C.G.; Somavilla, J.C.; Muraro, D.S.; Bernardi, O. Field-evolved resistance to chitin synthesis inhibitor insecticides by soybean looper, *Chrysodeixis includens* (Lepidoptera: Noctuidae), in Brazil. *Chemosphere*, 2020, 259(1):127499.
9. Machado, E.P.; Dos S. Rodrigues Junior, G.L.; **Führ, F.M.**; Zago, S.L.; Marques, L.H.; Santo, A.C.; Nowatzi, T.; Dahmer, M.L.; Omoto, C.; Bernardi, O. Cross-crop resistance of *Spodoptera frugiperda* selected on Bt maize to genetically-modified soybean expressing *Cry1Ac* and *Cry1F* proteins in Brazil. *Scientific Reports*, 2020, 10(1):10080.
10. Godoy, D.N.; **Führ, F.M.**; Stacke, R.F.; Muraro, D.S.; Marçon, P.; Popham, H.J.R.; Bernardi, O. No cross-resistance between CHINNPV and chemical insecticides in *Chrysodeixis includens* (LEPIDOPTERA: NOCTUIDAE). *Journal of Invertebrate Pathology*, 2019, 164(1):66-68.

PRESENTATION AT PROFESSIONAL MEETINGS

Oral presentation:

1. **Führ, F.M.**; Kennedy, H.; Kerns, D.L. Is resistance to Bt proteins occurring in populations of Southwestern corn borer (*Diatraea grandiosella*) from New Mexico, U.S.? Beltwide Cotton Conferences, January 2024, New Orleans, LA.
2. **Führ, F.M.**; Ribeiro, A.V; Menger, J.P.; Koch, R.L. Potential for chemical control of the soybean tentiform leafminer (Lepidoptera: Gracillariidae), a new pest of soybean. CFANS research symposium, April 2023, Minneapolis, MN.
3. **Führ, F.M.**; Ribeiro, A.V; Menger, J.P.; Koch, R.L. Lethal effects of insecticides against adults of *Macrosaccus morrisella* through multiple exposure routes. ESA Annual Meeting. November 2023, National Harbor, MD
4. Iuanami, M.Y.; **Führ, F.M.**; Thiesen, L.V.; Omoto, C.; Impact of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) resistance to chlorantraniliprole on larval survival and leaf consumption in soybean crops. 31^o SIICUSP, November 2023, Pirassununga, Brazil.
5. **Führ, F.M.**; Amado, D.; Costa, P.H.C.P.; Leal, R.M.; Küll, A.C.S.; Basso, M.; Omoto, C. Genetic basis of *Helicoverpa armigera* (Lepidoptera: Noctuidae) resistant to chlorantraniliprole: Implications for Insect Resistance Management. XXVIII Brazilian Entomological Conference (CBE) Annual Meeting, September 2022, Fortaleza, Brazil.
6. Costa, P.H.C.P.; Küll, A.C.S.; Amado, D.; **Führ, F.M.**; Basso, M.; Omoto, C. Is resistance to Bt soybean occurring in populations of *Helicoverpa armigera* (Lepidoptera: Noctuidae) from Central-West region of Brazil? XXVIII Brazilian Entomological Conference (CBE) Annual Meeting, September 2022, Fortaleza, Brazil.
7. **Führ, F.M.**; Pretto, V.E.; Godoy, D.N.; Garlet, C.G.; Hettwer, B.L.; Bernardi, O. Effects of the baculovirus ChinNPV on biological parameters of *Chrysodeixis includens* (Lepidoptera: Noctuidae). 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.
8. Pretto, V.E.; Stacke, R.F.; Godoy, D.N.; **Führ, F.M.**; Gubiani, P.S.; Garlet, C.G.; Bernardi, O. Evaluation of cross-resistance between teflubenzuron and other insecticides in *Chrysodeixis includens* (Lepidoptera: Noctuidae). 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.

9. Reis, A.C.; Gubiani, P.S.; **Führ, F.M.**; Somavilla, J.C.; Machado, E.P.; Bernardi, O. Susceptibility of *Dichelops furcatus* (Fabricius, 1775) (Hemiptera: Pentatomidae) to insecticides in topical application bioassays. 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.
10. Gubiani, P.S.; Somavilla, J.C.; Reis, A.C.; **Führ, F.M.**; Machado, E.P.; Bernardi, O. Susceptibility of *Euschistus heros* (Hemiptera: Pentatomidae) to insecticides in Brazil. 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.
11. Zago, S.L.; **Führ, F.M.**; Bernardi, O. Survival and development of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) resistant to Bt proteins on soybean expressing Cry1Ac/Cry1F. 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.
12. Moreira, R.P.; **Führ, F.M.**; Godoy, D.N.; Pretto, V.E.; Garlet, C.G.; Bernardi, O. Toxicity of the baculovirus ChinNPV and effects on biological parameters of *Chrysodeixis includens* (Walker, [1858]) (Lepidoptera: Noctuidae). 35^a Integrated Academic Conference (JAI), October 2020, Santa Maria, Brazil.
13. **Führ, F.M.**; Godoy, D.N.; Stacke, R.F.; Muraro, D.S.; Marçon, P.; Popham, H.J.R.; Bernardi, O. Absence of cross-resistance between baculoviruses (ChinNPV) and synthetic chemical insecticides in *Chrysodeixis includens* (Lepidoptera: Noctuidae). 34^a Integrated Academic Conference (JAI), October 2019, Santa Maria, Brazil.
14. Reis, A.C.; **Führ, F.M.**; Somavilla, J.C.; Bernardi, O. Susceptibility of populations *Dichelops furcatus* (Fabricius, 1775) (Hemiptera: Pentatomidae) to insecticides. 34^a Integrated Academic Conference (JAI), October 2019, Santa Maria, Brazil.
15. Rodrigues, G.L.S.; Machado, E.P.; **Führ, F.M.**; Zago, S.L.; Bernardi, O. Survival and development of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) resistant to Cry1F on Bt soybean expressing Cry1F + Cry1Ac. 34^a Integrated Academic Conference (JAI), October 2019, Santa Maria, Brazil.
16. Pretto, V.E.; **Führ, F.M.**; Godoy, D.N.; Bernardi, O. Lethal and sublethal effects of baculovirus (ChinNPV) on *Chrysodeixis includens* (Lepidoptera: Noctuidae). 34^a Integrated Academic Conference (JAI), October 2019, Santa Maria, Brazil.
17. Bexaira, K.; Krug, A.; Rizzatto, D.A.; Schaefer, E.; **Führ, F.M.**; Santos, J.P.; Andrade, N.; Lovato, T. Contrasts in the production system of *Lagenaria siceraria* in Rio Grande do Sul. Symposium on Teaching, Research, and Extension (SEPE), October 2015, Santa Maria, Brazil.

Poster presentation:

1. **Führ, F.M.**; Kerns, D.L.; Wilson, G.B.; Mays, T. Observation on Corn Leafhopper (*Dalbulus maidis*) and red stunt in the season 2024 in Texas State. ESA Annual Meeting. November 2024, Phoenix, AZ.
2. **Führ, F.M.**; Prigol, L.H.F.; Dias, P.V.C; Tarouco, C.P.; Gindri, R.G.; Ricachenevsky, F.K. Phenotypic characterization of rice plants containing a mutation in the metallothionein protein. 33^a Integrated Academic Conference (JAI), October 2018, Santa Maria, Brazil.
3. Rodrigues, T.R.; **Führ, F.M.**; Engel, G.H.; Scopel, J.V.F.; Santos, M.S.; Bamberg, D.; Follmann, D.N. Leaf angles related to the productivity of maize hybrids in Santa Maria, RS. 33^a Integrated Academic Conference (JAI), October 2018, Santa Maria, Brazil.
4. **Führ, F.M.**; Fagundes, L.K.; Fernandes, T.S.; Ludwig, E.J.; Oliveira, H.A.P.; Schmidt, P.M.; Nunes, U.R. Variation in the results of soybean seed analysis due to the moisture content of the germination paper. 29^a Integrated Academic Conference (JAI), October 2014, Santa Maria, Brazil.

EXTENSION PRESENTATIONS

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|----|---|----------|--------|-------|------|--------------|----|
| 1. | Soybean | Research | Center | Field | Day, | Minneapolis, | MN |
| | September 2023 | | | | | | |
| | Title: Lethal effects of insecticides against adults of <i>Macrosaccus morrisella</i> through multiple exposure routes | | | | | | |
| | Audience: Growers, industry partners, extension agents, and other stakeholders. | | | | | | |

2. Insecticide Resistance Action Committee (IRAC) Brazil annual meeting, Piracicaba, Brazil
September 2022
Title: Monitoring the susceptibility of *Helicoverpa armigera* (Lepidoptera: Noctuidae) to insecticides – season 2021/22
Audience: Industry partners from the mainly insecticide companies in Brazil.
3. Insecticide Resistance Action Committee (IRAC) Brazil annual meeting, via Zoom
September 2021
Title: Monitoring the susceptibility of *Helicoverpa armigera* (Lepidoptera: Noctuidae) to insecticides – season 2020/21
Audience: Industry partners from the mainly insecticide companies in Brazil.
4. Field day on gourd (*Lagenaria siceraria*) cultivation, Santa Maria, Brazil
December 2015
Title: Proper use of personal protective equipment (PPE) in the application of chemical pesticides
Audience: Growers.

FELLOWSHIPS

Masters Fellowship

Jun 2022 – Feb 2023

São Paulo Research Foundation (FAPESP), São Paulo

Process number: 2021/14552-1

Description: Scholarship for 9-month master project in the Department of Entomology and Acarology at ESALQ/USP (R\$ ≈ 20,000).

Undergraduate Scientific Initiation

August 2018 – March 2021

National Council for Scientific and Technological Development (CNPq) of Brazil

Process number: 044105

Description: Basis for the management of resistance to insecticides and toxins of *Bacillus thuringiensis* Berliner in some insect pests in Brazil (R\$ ≈ 7,000)

Undergraduate Scientific Initiation

April 2014-August 2016

Ministry of Education of Brazil, Tutorial Education Program, Federal University of Santa Maria

Description: Scholarship of 28 months to development of teaching, research and extension activities for the academic public and society in general; conducting events, seminars and lectures; approach between farmers and university; social and environmental activities in schools; solidarity activities (R\$ ≈ 11,000).

AWARDS AND HONORS

- 1st Place Prize Ph.D. Student Award (Gary A. Herzog Memorial) (\$400). 2024 Cotton Insect Research & Control Conference in Beltwide Cotton Conference, New Orleans, Louisiana.
Presentation title: Is Resistance to Bt Proteins Occurring in Populations of Southwestern Corn Borer (*Diatraea grandiosella*) from New Mexico?
- Awarded among the 40 best works of the Integrated Academic Week (JAI / UFSM) for the presentation of the poster: No cross-resistance between CHINNPV and chemical insecticides in *Chrysodeixis includens* (Lepidoptera: Noctuidae), 2019.

LEADERSHIP

President of Students academic directory

January 2015 – December 2015

Orlando Nobre Academic Directory (DAON), Federal University of Santa Maria

Activities: Facilitated discussions with students to organize various activities, including seminars, lectures, field trips to agricultural properties, freshman orientation events, and notably, led the curriculum overhaul for the agronomy program.

NON-ACADEMIC ACTIVITIES

Volunteer: Volunteer in the IMAMA group, which focuses on various topics: breast cancer, prevalent in our region and linked to high mortality rates; sexually transmitted diseases and teenage pregnancy; the importance of teenage organ donation; and factors leading to teenage smoking and its consequences.

LANGUAGES

English: Advanced
Spanish: Advanced
Portuguese: Native language
German: Basic

PROFESSIONAL MEMBERSHIPS

Entomological Society of America (ESA)	2023 – Present
Entomological Society of America Southwestern Branch	2024 – Present
Texas Plant Protection	2024 - Present
Beltwide Cotton Conference	2024 - Present