

# LEONARD BRYAN COOP

CURRICULUM VITAE revised 24/Jan/2011

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**Integrated Plant Protection Center & Department of Botany and Plant Pathology**  
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## PROFESSIONAL GOALS AND CAREER INTERESTS

To work in research, extension, and teaching in the fields of integrated pest management and natural resources management in the U.S. and internationally. I am especially interested in the area of decision support systems, including weather driven and spatialized pest disease risk and phenological models, biological control, pest monitoring, insect/host plant relationships, systems modeling, GIS, the web, and IPM delivery systems.

## EDUCATION

Doctor of Philosophy, Entomology, April 1987. Oregon State University, Corvallis, OR

Minors: Statistics and Integrated Plant Sciences. Credit hours earned (quarter system): 69 total, 13 Entomology, 20 minor, 36 thesis.

Master of Science, Entomology, May 1983. Oregon State University, Corvallis, OR

Minor: Statistics. Credit hours earned (quarter system): 73 total, 29 Entomology, 22 minor, 22 thesis.

Other post graduate credits: Earned at Oregon State University (quarter system): 20 Computer Science, 3 Agricultural Engineering, 4 French.

B. A., Biology, May 1979. Baker University, Baldwin City, KS 66006. Minor: Chemistry. Credit hours earned (semester system): 140.

GIS/GRASS Basic Training Aug. 1992. Central Washington Univ. Ellensburg, WA

GIS/GRASS Advanced Training Sept. 1994. Central Washington Univ. Ellensburg, WA

## WORK EXPERIENCE

Assistant Professor (Senior Research). Oregon State University Botany and Plant Pathology Dept. and Integrated Plant Protection Center - Oct 2002 to present. [OSU Entomology Dept prior to July 2002] Supervisor: Prof. Paul Jepson (2002-present). Recent and on-going projects and responsibilities include:

1. (July 1995-present) IPM Decision support and delivery systems for phenology and plant disease risk models. Research, support, and delivery of online weather data and pest models and GIS for numerous species of insects, plant diseases, crops, and weeds to provide timely and accurate information for crop and pest management in Oregon and the USA (USDA/NPDN, USDA/NRI, USDA/W. Region IPM Center, USDA/WRIPM Specialty grants, USDA/AFRI Plant Biosecurity).
2. (July 1999-present) Development and delivery of online decision support systems. A) Online version of the Pacific

Northwest Insect and Weed Control Handbooks. B) IPMP version 3.0. decision support system for Peppermint IPM.

3. (Sept. 1993-present) Development of personal computer, server, and internet systems technologies for integrated pest management research and Extension. A) Development and administration of internet and web computer servers, GRASSLINKS/GRASS GIS web interface. (primarily LAMP, LINUX/APACHE/MYSQL/PERL).

4. (Jan. 2005-present). Natural and conservation biological control of leafroller pests of raspberry and other caneberries in the NW. (USDA/CAR, USDA/WRIPM).

5. (Aug. 2006-present). Climate driven models of forest pathogens (Swiss needlecast of Douglas fir) (SWCC, USDA Forest Service FHP Technology Development Program).

Research Associate. Oregon State University Entomology Dept. and Integrated Plant Protection Center - July 1987 to Sept 2002. Supervisors: Prof. Paul Jepson (2000-2002), Prof. Marcos Kogan (1995-2000), Prof. Brian Croft (1987-1995).

Graduate Research Assistant. OSU Entomology Dept. Major Professor and supervisor: Dr. Ralph Berry. Jan. 1983 to June 1987. Doctoral thesis title: Management of variegated cutworm in peppermint.

Master's Thesis Project. OSU Entomology Dept. Major Professor: Dr. Glenn Fisher. Oct. 1979 to Dec. 1982. Masters thesis title: Orange Tortrix: Parasitoid complex and thermal constants for egg hatch.

Graduate Teaching Assistant. OSU Entomology Dept. Oct. 1979 to Dec. 1981. Prepared and instructed laboratory sessions for the following classes: Introduction to IPM, Aquatic Entomology, Insect Systematics, Insect Biology, IPM II, IPM III.

## **PUBLICATIONS - total accepted or in print: 26 (refereed), 72 (other)**

Coop, L.B. 1983. Orange tortrix: parasitoid complex and thermal constants for egg hatch. MS Thesis. Oregon State University, Dept. of Entomology. 125 pp.

Coop, L.B. and R. Berry. 1986. Reduction in variegated cutworm (Lepidoptera: Noctuidae) injury to peppermint by larval parasitoids. J. Econ. Entomol. 79:1244-1248.

Coop, L.B. and R. Drapek. 1987. Evaluating pheromone traps for corn earworm in sweet corn. Proc. Oregon Hort. Soc. 78:92-96.

Coop, L.B. 1987. Management of variegated cutworm in peppermint. PhD Thesis. Oregon State University, Dept. of Entomology. 154 pp.

Knight, A., R. LaLone, G. Fisher and L. Coop. 1988. Managing leafrollers on caneberries in Oregon. Oregon State University Ext. Circ. 1263. 8 pp.

Fisher, G., B. Croft, L. Coop and R. Drapek. 1988. Corn earworm pest management. Proc. Oregon Hort. Soc. 79:165-171.

Berry, R.E., L.B. Coop and J. Duvall. 1989. IPMP - Insect pest management in peppermint. Users Guide. OSU Special Pub. No. 834.

Coop, L.B., R. Drapek. 1989. Corn earworm report newsletter III (1-4). OSU Extension Entomology.

Coop, L.B., B.A. Croft, C. Murphy and S. Miller. 1989. Economic analysis of African locust/grasshopper control. Part I. GHLSIM technical reference. IPPC Oregon State Univ. 35 pp.

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- GHLSIM user manual. IPPC Oregon State Univ. 44 pp.
- Coop, L.B., B.A. Croft, C. Murphy and S. Miller. 1989. Economic analysis of African locust/grasshopper control. Part III. Analysis of the 1987 grasshopper campaign in Chad. IPPC Oregon State Univ. 56 pp.
- Coop, L.B., Drapek, R., B.A. Croft and G. Fisher. 1989. CEWSIM: Corn Earworm Damage Simulator. Version 1.1 Users manual. OSU Extension Entomology. 20 pp.
- Coop, L., A. Knight and G. Fisher. 1989. Parasitism of orange tortrix on caneberry, *Rubus* spp. in western Oregon and Washington. J. Entomol. Soc. Brit. Columbia 86: 63-65.
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- Drapek, R, L.B. Coop, B.A. Croft and G. Fisher. 1990. Improving pheromone trap catch for corn earworm monitoring in Oregon's Willamette Valley. Southwest. Entomol. 15:63-69.
- Coop, L.B., R. Drapek, B. Croft and G. Fisher. 1990. CEWSIM: Corn Earworm Damage Simulator. Version 1.5 User's manual. OSU Extension Entomology. 20 pp.
- Coop, L.B., B.A. Croft. 1990. GHLSIM: Sahelian grasshopper/crop loss simulation. Workshop on modeling pest-crop Interactions. International Benchmark Sites Network for Agrotechnology Transfer. University of Hawaii Research Extension Series 120:30-31.
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- Dively, G.P. and L.B. Coop. 1992. Millet loss assessment project, Mali, 1990. Project Report. Submitted to United States Agency for International Development Africa Bureau, Washington D.C. Jan. 1992.
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- Coop, L.B., Drapek, R., B.A. Croft, and G. Fisher. 1992. Relationship of corn earworm (Lepidoptera: Noctuidae) pheromone catch and silking to infestation levels in Oregon processing sweet corn. J. Econ. Entomol. 85:240-245.
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- Coop, L.B., G.P. Dively, A.J. Dreves, and B. Sidibe. 1993. The adjusted length method. In: Jago, N. [ed.] Millet Crop Loss Assessment Methods. Bull. 62. Natural Resources Institute [Overseas Development Administration] Chatham, England. pp. 9-12.
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- Horton, D.R., E.C. Burts, T.R. Unruh, J.L. Krysan, L.B. Coop, and B.A. Croft. 1994. Phenology of fall dispersal by winterform pear psylla (Homoptera: Psyllidae) in relation to leaf fall and weather. *Canadian Entomologist* 126:222-230.
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Coop, L. B. 1999. Phenology Models Research and Delivery for Areawide Tree Fruit IPM. Area Wide Codling Moth Project Report - 1999. Oregon State University Integrated Plant Protection Center Web site: <<http://osu.orst.edu/dept/ippc/wea/phenolrpt99.html>>

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Coop, L. B., M. Kogan and W. Bajwa. 2000. Extending the principles and lessons learned outside the project and to other commodities. In: Areawide Program for Suppression of Codling Moth: Summary of the Effect of 5 Years of Control. Proc. 95th Ann. Wash. State Hortic. Assoc. pp. 176-183.

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Coop, L. B. 2001. Web Publishing System for Pacific Northwest Weed Management Handbook. William, R. D. Lead Editor. OSU Extension / Integrated Plant Protection Center Web Site Publication E.06-01-1: <<http://pnwpest.org/pnw/weeds>>

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Information Systems analysis. <<http://ippc2.orst.edu/glinks>>

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- Coop, L. B. 2002. Online pear scab and powdery mildew risk model summaries for Hood River and Medford, Oregon. Oregon State University Integrated Plant Protection Center Web Site (e.g. Hood River: <<http://pnwpest.org/hr>>
- Coop, L. B. 2002. Daily and interactive degree-day maps for the northwest: Idaho, Montana, Oregon, Washington, and Wyoming. Online degree-day modeling and interactive GIS tools. Oregon State University Integrated Plant Protection Center Web Site (e.g. Idaho): <<http://pnwpest.org/id/ddmaps.html>>
- Coop, L. B. 2003. Northwest degree-day mapping calculator. Version 2.0. Oregon State University Integrated Plant Protection Center Web Site Publication E.04-00-1: <<http://pnwpest.org/cgi-bin/nwmapmaker.pl>>
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- Coop, L. B. 2003. Degree-days for Pest Management: Website Decision Making Tools. Proceedings 5<sup>th</sup> Annual Small Fruit Grower's Workshop. WSU Vancouver, March 19, 2003. pp. 60-62.
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## **SKILLS**

Development of integrated pest management systems

Systems modeling of arthropod, weed, disease, and crop phenology, population dynamics and ecological interactions

Development of decision support systems (integrated delivery systems, knowledgebases, expert systems, models, databases, and GIS)

Development and maintenance of World Wide Web pages (HTML, XML, Javascript, etc.)

Geographic information systems: GRASS 4.3 & 5.0, GRASSLinks, IDRISI, ArcView

GIS database development and delivery (USGS NLCD & DEM, US Census Bureau TIGER, EPA Ecoregions, STATSGO Soils, etc.)

Development of database applications (MySQL, Perl DBI, DB\_Browser)

Global Positioning Systems (GPS)

Statistical Analysis: NCSS, R

Statistics Classes Completed: Statistical Methods for Research Workers, Field Plot Techniques, Regression Analysis, Multivariate Analysis, Quantitative Ecology, Systems Ecology, Simulation Analysis (audit), Statistical Computing Survey

Programming Languages: Perl, C, C++, Pascal, FORTRAN, BASIC, PROLOG, UNIX shell scripts, CGI, HTML, Javascript, Coldfusion

Computer Science Classes Completed: Intro Computing (structured BASIC), Fund. Comp. Prog. (Pascal I & II), Computer Organization, Data Structures I-III, Computer Languages (ML, Lisp, C++, Smalltalk, Prolog), Expert Systems for Agriculture, C/Unix (audit), Unix systems Administration (audit), Networking (audit)

Computer Operating Systems/Applications: UNIX, LINUX & PC systems administration, internet, Macintosh, Windows, spreadsheet, database, word processing, graphics (Photoshop/GIMP), multimedia, Google Maps API, GRASS GIS, GRASSLinks webGIS, Idrisi GIS, ArcView GIS, open source software tools in general.

Collaborative: teaching, personnel management, project management, grant writing and submission

**SOFTWARE DEVELOPED AND MAINTAINED** (all within the domain of IPM Decision Support Systems):

MINTSIM - simulation model of Variegated Cutworm injury and economic thresholds in Peppermint (Pascal). PC & Web software. Most recent version completed 2002. Released as part of IPMP 2.0 and 3.0., Online at <http://mint.ippc.orst.edu/msim.html>

CEWSIM - simulation model and decision support software for corn earworm in sweet corn (Pascal). Latest version 1.5 completed 1991. PC (DOS) software available from IPPC.

GHLSIM - simulation model/database system for grasshopper/locust damage to millet (West Africa) (Pascal). PC software Submitted to USAID/Africa Bureau.

RESIST - simulation model/geographic information system for resistance management of pear psylla (with assistance from Mike Caprio and Kevin Currans). (C/C++, GRASS GIS) PC/Unix software (not distributed).

GENMOD - generalized phenology modeling system for peppermint pests (Pascal). First developed 1990. PC Software (released as part of IPMP 2.0)

MITECALC - online modeling calculator for biological control of spider mites using predator mites (Javascript/HTML) (version 1.1 July, 1997) <http://uspest.org/ipm/mcalc.html>

Sampling and threshold calculator for management of strawberry root weevil (Javascript/HTML) (last update 5/1/96) <http://uspest.org/cgi-bin/ipmpsrw.pl>

IPMP versions I & II. Insect pest management in peppermint. Decision support system (Perl/C/C++, software for IPM PC). Available from IPPC. (version 2.0 avail. 1996). Version 3.0 online at <http://mint.ippc.orst.edu>

OPMDDC, Online phenology models and degree-day calculator. Using 1300+ online weather stations for degree-day calculations and 44 models for insects, mating disruption dispensers, plant diseases, and crop species, and weeds (as of Jan, 2002) (Perl/Unix scripts/Javascript/HTML) Version 3.1 <http://uspest.org/cgi-bin/ddmodel.pl> (online May 1997, with ongoing updates)

ODDMAPS, Online daily degree-day maps of Oregon. GIS/mapping and degree-day modeling system for Oregon (Perl/Unix scripts/HTML/GRASS) <http://uspest.org/wea/ddmaps.html> (online May 1998, 48-state version 2005, with ongoing updates)

MAPMAKER.PL, Oregon degree-day mapping calculator (Perl/Unix scripts/HTML/GRASS) <http://pnwpest.org/cgi-bin/mapmaker.pl> (online Dec. 1998, replaced by NWMAPMAKER and then USMAPMAKER starting in 2003)

PEARSURVEY.CFM, Dynamic report writer for Oregon pear growers survey (online database analysis system) (Coldfusion/HTML) <http://ippc.orst.edu/IPMsurvey/cfgph/pearsurvey.cfm> (online Dec. 1, 1998)

PNW2.PL Online publishing engine and decision support system (prototype) for Pacific Northwest Pest Control Handbooks (Perl/Unix scripts/HTML) <http://ippc2.orst.edu/cgi-bin/pnw2.pl> (completed Sept. 1998)

Online publishing engine and decision support system for Pacific Northwest Weed Control Handbook (Perl/Unix scripts/HTML) <http://uspest.org/pnw/weeds> (completed June 2001, with yearly updates)

IPMP 3.0 Integrated Pest Management in Peppermint. Online Decision support system (HTML/Javascript/Perl) <http://mint.ippc.orst.edu> (online June 2001, updated July 2002, with ongoing updates)

GRASSlinks 3.5. IPPC Public Access GIS. Web interface to maps, databases, and Geographic Information Systems analysis (Perl/GRASS/HTML). <http://ippc2.orst.edu/glinks> (online Aug. 2001, version 3.5 completed Jan 2007, with ongoing updates)

USMAPMAKER.PL, 48-state degree-day mapping calculator (Perl/Unix scripts/HTML/GRASS) <http://uspest.org/cgi-bin/usmapmaker.pl> (online Feb. 2003 (5 state version), 2005 (48 state version) with ongoing updates)

Online publishing engine and decision support system for Pacific Northwest Insect Control Handbook (Perl/Unix scripts/HTML) <http://uspest.org/pnw/insects> (online Aug 2002, with yearly updates)

IPMC-PNW Coalition Web Portal - IPM News and Discussion consolidation website for the Pacific Northwest - <http://pnwpest.org/pmc/index.pl> (online July 2003 - 2007)

STEMRUST1 – Grass seed stem rust simulation model, with plant growth, stem rust infection and build up, and fungicidal effects to determine optimal control strategies for Western Oregon grass seed grower. Model by Bill Pfender, model programming by Dan Upper, Dean Wills, and Dan Debrito, user interface and web programming by Len Coop. Updated yearly since 2004. <http://uspest.org/cgi-bin/stemrust1.pl>

Douglas fir: Swiss needle cast risk model – Online mapping and model visualization. A climate and terrain based model of swiss needle cast severity. Last updated April 2008. <http://uspest.org/snc>

## LANGUAGE PROFICIENCY

English (native)

French (2 years University level): written, verbal - some.

German (3 years High School, 2 years University level): written, verbal - some.

## CURRENTLY FUNDED PROJECTS:

Aug 2010-Jul 2013. WSC-PIPE. Specialty Crops in the Western USA - Pest Information Platform for Extension and Education. Monitoring, diagnosis, forecasting and reduced risk management of invasive pests and diseases. USDA RMA Jepson, P (PD), Coop, L (Co-PD). \$999,969. (Pest risk modeling and mapping portion \$260,195)

Jan 2010-Jul 2012. Sustainable grape pest management for California using weather data, models, and cultural controls. *Calif. Dept. Food and Agri. SCBGP*. Coop, L. (PD of subcontract); Gubler, W.D., Broome, J.C. \$154,359.

Mar 2010 – Feb 2013. Automated mesoscale pest risk forecast maps for agricultural production and potential plant biosecurity threats. *USDA AFRI Plant Biosecurity*. Coop, L, Gent, D, Mahaffee, W, Johnson, D., Gubler, W.D. \$996,112.

Sept 2009 – Aug 2011. IPM Disease Risk Forecasts and Virtual Weather for Western States. *USDA WRIPM Specialty Grants*. Coop, L.B., Jepson, P., Gent, D., Grove, G. \$179,227.

April 2009 – Mar 2011. Adapting and improving swiss needle cast management tools to incorporate climate change. *USDA Forest Service PNW Region – FHP Technology Development Program*. Stone, J., Coop, L. \$121,581.

Jan 2008 - Dec 2009. Accessing IFPnet weather data through the OSU Integrated Plant Protection Center pest and disease modeling system. *Columbia Gorge Fruit Growers/ARF*. L. Coop, S. Castagnoli, L. Long. \$12,000.

July 2009 – June 2010. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System *USDA NPDN (Nat. Plant Diag. Network)*. L. Coop, P. Jepson. \$53,400.

Apr 2009 – Mar 2011. Implementing conservation biological control for caneberries. *USDA PMAP*. P. Jepson, L. Coop, J. Lambrinos. \$270,835.

## GRANTS - total awarded to date: \$4,762,374

Aug 2010-Jul 2013. WSC-PIPE. Specialty Crops in the Western USA - Pest Information Platform for Extension and Education. Monitoring, diagnosis, forecasting and reduced risk management of invasive pests and diseases. USDA RMA Jepson, P (PD), Coop, L (Co-PD). \$999,969. (Pest risk modeling and mapping portion \$260,195)

Jan 2010-Jul. 2012. Sustainable grape pest management for California using weather data, models, and cultural controls. *Calif. Dept. Food and Agri. SCBGP*. Coop, L. (PD of subcontract); Gubler, W.D., Broome, J.C. \$154,359.

Jan 2010 – Dec 2012. Automated mesoscale pest risk forecast maps for agricultural production and potential plant biosecurity threats. *USDA AFRI Plant Biosecurity*. Coop, L, Gent, D, Mahaffee, W, Johnson, D., Gubler, W.D. \$996,112.

July 2009 – June 2010. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. \$53,400.

Sept 2009 – Aug 2011. IPM Disease Risk Forecasts and Virtual Weather for Western States. USDA WRIPM Specialty Grants. Coop, L.B., Jepson, P., Gent, D., Grove, G. \$179,221.

April 2009 – Mar 2011. Adapting and improving swiss needle cast management tools to incorporate climate change. USDA Forest Service PNW Region – FHP Technology Development Program. Stone, J., Coop, L. \$121,581.

Jan 2008 - Dec 2009. Accessing IFPnet weather data through the OSU Integrated Plant Protection Center pest and disease modeling system. Columbia Gorge Fruit Growers/ARF. L. Coop, S. Castagnoli, L. Long. \$12,000.

July 2008 – June 2009. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson \$82,583.

Apr 2009 – Mar 2011. Implementing conservation biological control for caneberries. USDA PMAP. P. Jepson, L. Coop, J. Lambrinos. \$270,835.

Jun 2007 – May 2008. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. \$80,000.

Jan-Nov 2007. A Spatial model for predicting swiss needle cast distribution and severity. Swiss Needle Cast Cooperative. J. Stone, L. Coop. \$48,532.

Jul 2006 – Jun 2007. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. \$81,000.

Jan 2006-Jan 2009. Taming uncertainties in multi-scale pest and disease model and decision support tools for plant biosecurity. USDA NRI – Plant Biosecurity. L. Coop, P. Jepson, C. Daly, W. Mahaffee, G. Taylor. \$645,000.

Jul 2005 – Jun 2006. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). P. Jepson, L. Coop, H. Luh. \$110,000.

Jun 2005 – May 2006. Assessing the contribution of biocontrol for leafrollers in caneberries ORBC (OR Raspberry and blackberry Commission/ARF): L. Coop, M. Ambrosino. \$9,879.

Mar 2005 – Dec 2005. Determining the potential of biocontrol for leafrollers in caneberries. USDA WR-IPM. L Coop, P. Jepson. \$59,979

Sep 2005 – Aug 2008. Enabling transition to biocontrol of leafrollers in caneberries. USDA CAR (Crops at Risk). P. Jepson, L. Coop. \$477,427.

Sep 2005 – Aug 2006. Swiss Needlecast GIS modeling framework. Swiss Needle Cast Cooperative. J. Stone, L. Coop, D. Manter. \$25,000.

Jul 2004 – Jun 2005. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). P. Jepson, L. Coop, H. Luh. \$105,000

Jun 2005. New server for pest modeling, GIS, and webserving. NPDN/WRPMC. L. Coop, P. Jepson. \$5,000.

Feb 2004 - May 2004. Development of a Database of Host and Pest Taxonomies for NPDN (National Plant Diagnostic Network). L. Coop, D. Upper, P. Jepson. Subcontract with USDA/APHIS/NAPIS/NPDN/Purdue Univ. \$10,000.

July 2004 - June 2006. Stem Rust Prediction and Decision Aid for Disease Management. C. Lipp, L. Coop, W. Pfender. CSREES GSCSSA. \$84,908.

Aug 2003 - July 2005. Regional Internet and GIS-Based Multiple pest Forecasting and Risk Management System. L. Coop, and R. Spotts, Project Directors. USDA WR-IPM Grants Program. \$98,000.

Aug 2003 - July 2005. Electronic Delivery of IPM and Decision Support Tools for Field Use. R. William, M. Engels. USDA WR-IPM Grants Program. \$29,000.

Jan - July 2003. Cutworm Risk Mapping GIS. Sub-contract to Montana State University. Provide automated data processing and mapping of cutworm risk monitoring data for 7-state western region. \$5,000.

Sept 2001 - Aug 2003. IPM Web Portal System. Western Regional Pest Management Centers USDA Grants Program.

Oregon Proposal FY 2002-2003 \$26,000 (Objective 2. Establish a state/multi-state/territory based pest management information and communication network linking USDA and other Federal agencies with agricultural researchers and stakeholders throughout the region.) (Lead authors Jeffrey Jenkins, Paul Jepson and Marcos Kogan).

July 1999 - July 2002. Information Exchange Driven IPM: Applied Research and Decision Support. L. Coop, M. Kogan, W. Bajwa. WR-IPM USDA Grants Program. \$100,000.

July 1999 - June 2001. Web-based Decision Support System for Integrated Pest Management. Online version of PNW Pest Control Handbooks. L. Coop, Principal Investigator. OSU Extension Service Innovative Projects. \$10,000.

July 1999 - Jan 2002. Online Decision Support System for Integrated Pest Management on Peppermint - IPMP version 3.0. R. Berry, L. Coop. Mint Industry Research Council & Oregon Mint Commission. \$19,648.

Jan 1999 - Sept 1999. Areawide management of Codling Moth. USDA areawide control project. (Co-author with M. Kogan and W. Bajwa). \$20,000.

July 1998 - June 1999. Oregon Processed Vegetable Commission. Regional pest monitoring program. \$9,800.

Mar 1998 - Feb 1999. Areawide Management of Codling Moth. L. Coop, M. Kogan, W. Bajwa. USDA Areawide Control Project. \$15,000

Mar 1997 - Feb 1998. Areawide Management of Codling Moth. L. Coop, M. Kogan. USDA Areawide Control Project. \$27,416

Jun 1996 - Jun 1998. Phenology Mapping of Tree Fruit Pests. L. Coop, M. Kogan. Western Regional IPM USDA Grants Program. \$60,000.

Jun 1995 - July 1996. Phenology Mapping of Tree Fruit Pests. L. Coop, M. Kogan, B. A. Croft. Western Regional IPM USDA Grants Program. \$15,910.

March 1995. Biological Control of Spider Mites with Neoseiulus fallacis. L. Coop, B. A. Croft. Strawberry Commission/CAAR. \$12,000.

Feb 1995 - Jan 1996. Dispersal of Neoseiulus fallacis, a Biological Control Agent of Spider Mites in Strawberry and Raspberry. L. Coop, B. A. Croft. Northwest Center for Small Fruits Research (USDA). \$12,000.

May 1991 - Apr 1992. Decision tools for grasshopper control in the Sahel. \$101,000. L. Coop, B. A. Croft. USAID/Africa Bureau. Matched by additional field research support of \$25,000 by USAID/Mali.

Jan 1990 - Apr 1991. Economic analysis of grasshopper and locust control in the Sahel of Africa. L. Coop, B. A. Croft. \$61,000. USAID/Africa Bureau. Matched by additional field research support of \$50,000 by USDA/OICD and USAID/Mali.

June 1987 - May 1989. Management of corn earworm in processed sweet corn. L. Coop, R. Drapek, B. A. Croft. Oregon State University Agricultural Experiment Station. \$30,000.

Jan 1987 - Dec 1991. Control of corn earworm in processed sweet corn. L. Coop, R. Drapek, B. A. Croft. Oregon Processed Vegetable Commission. \$47,000.

## **SCHOLASTIC ACHIEVEMENTS & ORGANIZATION MEMBERSHIPS**

2008-present. Member Western Extension Research Activity (WERA) 102 - Climate Data and Analyses for Applications in Agriculture and Natural Resources

2007-present. Member American Phytopathological Society

1983-2001, 2007-present. Member of Entomological Society of America.

2005-present. Member Western Weather Systems Workgroup

2004-present. Member National Plant Diagnostics Network

1997-2003. Member local and campus Linux computer user groups.

1998. Infoworld Top 100 Innovative Technology Achievements Award.

1995-2006. National IPM Network representative and member of Standards Committee.

1992-1995. Member Organization for Sustainable Agriculture.

1988-1992. Member of Southwestern Entomological Society.

1986. OSU Entomology graduate student travel award.

1980-81, 1984-85. Departmental representative in Graduate and Professional Student Association.

1977. Freshman chemistry award (top student in general chemistry).

1975-79. Kansas State Scholar award and scholarship.

1975-79. Baker University Honors scholarship.

#### **EXTENSION ACTIVITIES, PRESENTATIONS, TRAININGS, AND INTERNATIONAL (last 20 years)**

Ellen, G., P. Jepson, L. Coop, Mace Vauhan. 2010. Farmscaping for Predators, Parasitic Wasps, and Native Bees in PNW Berry Systems. Farmwalk and Farmscaping Exercise for Blueberry and Caneberry Growers. Riverbend Organic Farms, LLC, July 13, 2010, Jefferson, OR.

Coop, L. & The Western Weather Workgroup. 2010. The Prospect of virtual weather for pest and disease management in winegrapes. Oregon Wine Industry Symposium. Feb 22, 2010, Eugene, OR.  
[http://explorer.oregonwine.org/symposium/files/Sessions/Viticulture/VineyardTech/Vineyard\\_Tech.pdf](http://explorer.oregonwine.org/symposium/files/Sessions/Viticulture/VineyardTech/Vineyard_Tech.pdf)

Coop, L., G. Ellen, P. Jepson. 2010. Biological and landscape alternatives for leafroller management in caneberries – Fifth Annual Pre-Season Production Workshop for Caneberry Growers. Oregon Raspberry and Blackberry Commission. Mar. 3, 2010, Woodburn, OR.

Coop, L. 2010. Virtual Weather Stations and Their Application to Pest and Disease Modeling. Blue Mountain Horticultural Society. Annual Meeting. Feb. 2, 2010, Milton Freewater, OR.

Coop, L., G. Ellen, P. Jepson. 2010. Biology and Ecology of Parasitoids in Raspberries – Extension talk at 55<sup>th</sup> Annual N. Willamette Horticulture Society Meeting, Organic Section, Jan. 12, 2010.

Thomas, C., Coggeshall, A., R. Bostock, E. Luke, M. Hill, T. Creswell, C. Estep, D. Barber, L. Coop, P. Jepson, H. Beck, F. Nutter, L. Madden. 2009. NPND Launches Epidemiology Analysis Program. Poster at: NPND National Meeting, Miami FL, Dec. 2009.

Coop, L., S. Castagnoli. 2009. Hood River IPM Insect and Disease Pest Modeling Website Review/Preview and Focus Group. 2-hour meeting/presentation/focus session w/selected growers and fieldmen. Dec. 11, Hood River, OR.

Coop, L., L. Long. 2009. The Dalles IPM Insect and Disease Pest Modeling Website Review/Preview and Focus Group. 2-hour meeting/presentation/focus session w/selected growers and fieldmen. Dec. 11, The Dalles, OR.

Coop, L. 2009. Oregon Report presenting: Oregon IPPC & Western Weather Workgroup Activities – Nov. 2009. WERA-102 Annual Meeting: Climatic Data and Analyses for Applications in Agriculture and Natural Resources, Monterey, CA. Nov 17, 2009.

Coop, L., A. Fox, W. Mahaffee, D. Gent, W. Pfender, C. Daly, C. Thomas, P. Jepson. Forecast and Virtual Weather

- Driven Plant Disease Risk Modeling System. Poster at: APS National Annual Meeting, Portland, OR, August 2009.
- Coop, L., G. Ellen. 2009. On-going Work on Beneficials in Caneberries. Caneberry Open House – Extension Event, NWREC, July 8, 2009. Aurora, OR.
- Coop, L. 2009. Conservation Biological Control – Supporting the Needs of Leafroller Parasitoids in Caneberries. Bugscaping Farm Walk – Extension Program, June 16<sup>th</sup>, 2009. Woodburn, OR.
- Coop, L. 2009. Forecasting weather and climate for plant disease models: A western perspective. North Central Division APS Annual Meeting, Ames, IA, June 22, 2009. Symposium: Implications of Climate Change on Plant Pathogens.
- Ambrosino, MD., L. Coop, P. Jepson. Enhancing Leafroller Parasitoids in Caneberries. Poster at: Sixth International IPM Symposium, Portland, OR, March 2009.
- Coop, L. 2008. Orange Tortrix: Biology and Biological Control. NW Horticultural Society Meeting, invited speaker. Jan. 17, 2008. Canby, OR.
- Coop, L., P. Jepson, G. Grove, A. Fox, C. Daly, W. Mahaffee, C. Thomas. 2008. Delivery of IPM Tools in Real Time for Decision Support – Pull. APS Pacific Division Annual Meeting, Jackson, WY, June 25, 2008. Symposium.
- Coop, L. 2008. Swiss Needle Cast Risk Model Presentation. Swiss Needle Cast Cooperative Field trip, Apr 29, 2008. Newport-Corvallis, OR.
- Coop, L., J. K. Stone, and A. Fox. 2007. A Spatial Model for Foliar Life Expectancy in Douglas Fir Affected by Swiss Needle Cast. Poster. APS National Meeting, Jul 29-30 2007. San Diego, CA. *Phytopathology* 97:S24.
- Coop, L., C. Daly, A. Fox, D. Gent, G. Grove, D. Gubler, P. Jepson, W. Mahaffee, W. Pfender, G. Taylor. Taming Uncertainties in Multi-Scale Pest and Disease Model and Decision Support Tools for Plant Biosecurity. Presentation. APS National Meeting, Jul 29-30, 2007. San Diego, CA.
- Pfender, W., W. Mahaffee, L. Coop, A. Fox, C. Daly, C. Thomas, W. Gubler, G. Grove, D. Gent, J. Strand, G. Taylor, P. Jepson, R. Graw. 2007. Western Weather Systems Workgroup: A collaborative effort to improve weather information for IPM. APS National Meeting, Jul 29-30 2007. San Diego, CA. *Phytopathology* 97:S92
- Pfender, W., J. Eynard, L. Coop. 2007. Sensitivity of a rust simulation model to inputs of temperature obtained at standard weather observation height vs canopy height. APS National Meeting, Jul 29-30 2007. San Diego, CA. *Phytopathology* 97:S92
- Coop, L. 2006. Weather Models and Pest Management Decision Timing. Integrated Soil Nutrient and Pest Management Workshop, Nov. 8, 2006. Corvallis, OR. OSU Extension Service.
- Stone, J. K. and L. B. Coop. 2006. Predicting the effects of climate change on Swiss needle cast. Western International Forest Disease Work Conference. Oct 2-6, 2006. Smithers, BC.
- Coop, L. and P. Jepson. 2006. Support for grower networks by OSU IPPC – Online weather data and pest models. Sept 12, 2006. Milton-Freewater, OR. Grower meeting run by Umatilla Co. Extension.
- Stone, J. K. and L. B. Coop. 2006. Predicting effects of climate change on Swiss needle cast disease in the Pacific Northwest. APS/CPS/MSA joint meeting, Jul 29-Aug 2, 2006, Quebec-City, QC.
- Stone, J. K., L. B. Coop, and D. K. Manter. 2006. A spatial model for predicting effects of climate change on Swiss needle cast disease severity in the Pacific Northwest. July 18-22, 2006. Ft. Collins CO. USDA-Forest Service: Advances in Threat Assessment and its Implications for Forest and Rangeland Management.

- Coop, L. B. 2006. Online IPM Weather Data and Degree-Days – 2006 Update. L. Coop. Poster. Apr. 6, 2006. St. Louis, MO. 5<sup>th</sup> National IPM Symposium.
- Coop, L. and P. Jepson. 2006. Oregon State University IPPC Online Programs: IPM Decision Support Tools. Presentation. Apr. 6, 2006. St. Louis, MO. 5<sup>th</sup> National IPM Symposium.
- Blodgett, S. W. Lanier, L. Coop and C. Ford. 2006. Montana's Integrated Pest Management Program: Developing a Museum IPM Program and a Regional Cutworm Forecast. Presentation. Apr. 5, 2006. St. Louis, MO. 5<sup>th</sup> National IPM Symposium.
- Coop, L. 2006. Weather Models and Pest Management Decision Timing. Presentation. Feb 17, 2006. Redmond, OR. Presentation – Central Oregon Pest Management Course, OSU Extension.
- Coop, L. 2006. Concepts of IPM. Redmond, OR. Feb 17, 2006. Redmond, OR. Presentation – Central Oregon Pest Management Course, OSU Extension.
- Coop, L. 2006. Use of GIS and Weather data for online crop and pest management models. Jan 9, 2006. Corvallis, OR. OSU CSS Dept. Seminar.
- Coop, L. 2005. Interpolation & Pest Modeling: Codling Moth Degree-Day Model" L. Coop. Presentation. Nov. 10, 2005. Corvallis, OR. PIPE Meeting – Western Weather Systems Workgroup & CSREES.
- Coop, L. 2005. Weather Models and Pest Management Decision Timing. Integrated Soil Nutrient Management Options: Practices and Tools to Protect Water Quality. Oct. 26, 2005. Vancouver, WA. iSNAP Workshop.
- Coop, L., P. Jepson, A. Fox, D. Upper. 2005. Weather networks and internet-based management tools for orchard IPM. Invited Presentation, 3rd Asia-Pacific Congress of Entomology. Oct. 2005. Jeju, S. Korea.
- Coop, L. 2005. Web-Based Decision Support Tools for Nursery IPM. Farwest Nursery Show Seminars. Oregon Convention Center, Aug 2005. Portland, OR.
- Coop, L. 2005. Using Degree-Day Models in Pest Management. Washington State University. 6th Annual Small Fruit Grower's Workshop, Mar. 2004. Vancouver, WA.
- Song, Y., H. Riedl, L. Coop, M. Omeg, S. Castagnoli, and L. E. Long. 2004. Development and validation of phenology models for predicting cherry fruit fly oviposition in the Mid-Columbia area. Poster, 44<sup>th</sup> Annual Pest Management Conf., Jan 2004, Portland Oregon.
- Dec. 2003. Lyndon, Washington. "Degree-days for Pest Management: Website Decision Making Tools" presentation at the 5<sup>th</sup> Annual Small Fruit Grower's Workshop. WSU Lyndon, WA.
- Jun. 2003. Londrina, Brazil. Co-presented a workshop, "Systems IPM, Decision Support Systems and Pest Alerts", sponsored by USDA and Embrapa, Brazil.
- Aug. 2003. IPPC. Supplement to Oregon IPM Newsletter: On-line, Site Specific Degree-Day Predictions Using GIS and Climate Map Technologies [online]. Coop, L., P. Jepson. Oregon State University: Integrated Plant Protection Center. April, 2003 - [cited August 8<sup>th</sup>, 2003]. Available from Internet: <http://oregonipm.ippc.orst.edu/On-Line%20DD.pdf>
- Apr. 2003. Hood River, Oregon. "Web-based phenology modeling and mapping: applications for pest and disease management in tree fruits". Mid-Columbia Agric. Res. and Ext. Center Seminar.
- Apr. 2003. Indianapolis Indiana. 4<sup>th</sup> National IPM Symposium/Workshop. Poster Abstract, "Online IPM Decision Tools In the Northwest". Leonard Coop, Waheed Bajwa, and Paul Jepson.
- Apr. 2003. Indianapolis Indiana. 4<sup>th</sup> National IPM Symposium/Workshop. Poster Abstract, "Online Site-Specific

Degree-Day Predictions Using GIS and Climate Map Technologies". Leonard Coop and Paul Jepson.

Apr. 2003. Indianapolis Indiana. 4<sup>th</sup> National IPM Symposium/Workshop. Poster Abstract, "Regionalization of Cutworm Forecasts and Risk Warnings". Will Lanier, Sue Blodgett, Gregory D. Johnson, and Leonard Coop.

Apr. 2003. Indianapolis Indiana. 4<sup>th</sup> National IPM Symposium/Workshop. Poster Abstract, "A Multi-Region Internet-based Extension Pest Alert System". Waheed Bajwa, Leonard Coop, and Paul Jepson.

Mar. 2003. Vancouver, WA. "Degree-Days for Pest Management: Website Decision Making Tools". Washington State University. 5th Annual Small Fruit Grower's Workshop in Vancouver WA.

Mar. 2003. Wageningen, The Netherlands. Poster Presentaion, "A Phenological modeling and mapping system for NW USA: monitoring networks, pest models, online GIS, and site-specific predictions using open source technologies" at European Phenological Conference: Towards an operational system for monitoring, modeling, and forecasting of phenological changes and their socio-economic impacts. 31 March - 2 April.

Jan. 2003. Bozeman, Montana. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". Invited seminar at Dept. Entomology, Montana State University.

Jan. 2003. Bozeman, Montana. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". IPM Crop School Workshop, Montana State University.

Feb. 2002. Corvallis, Oregon. "Open Source Software and IPM Decision Tools". OSU Entomology Dept. Seminar.

Feb. 2002. Boise, Idaho. L. Coop. "Demonstration of PMC Portal, Pest Alerts, and Web-GIS Pest Management Decision Tools". 45 minute presentation. IPPC/USDA CSREES Western Region Pest Management Center/PNW Pest Management Coalition Meeting.

Oct. 2001. Corvallis, Oregon. L. Coop. "Pest Management Decision Tools: Examples of web-based phenology models, GIS, and databases for IPM decision support". 45 minute presentation. IPPC/USDA CSREES Western Region Pest Management Center/PNW Pest Management Coalition Agroecological Regions Workshop: The Application of Watershed, Basin, and Ecoregion Analytical Tools to Pest Management.

Sept. 2001. Corvallis, Oregon. L. Coop. "Web-Based Pest Management Tools". 2.5 hour OSU Extension Conference Technical Workshop with B. Simko, W. Bajwa, J. Pscheidt.

July 2001. Queensland, Australia. L. Coop. "A Web-Based Server System for Phenology Modeling. Combining weather networks, development and risk models, GIS and the internet for Agricultural & IPM decision". Invited seminar and workshop conducted at Queensland Gov. Natural Resources and Mines, Brisbane, Queensland Australia.

June-July 2001. Victoria, Australia. L. Coop. "A Web-Based Server System for Phenology Modeling. Combining weather networks, development and risk models, GIS and the internet for Agricultural & IPM decision support". Invited seminar and workshop conducted at Agric. Research institutes in Knoxfield, Rutherglen, Tatura, and Horsham, Victoria Australia.

July 11, 2001. Victoria, Australia. "Virtual crop a model answer to growers' prayers" By Andrew Madden. The Weekly Times, Business Section. (Newspaper article).

Jan. 2001. Bozeman, Montana. L. Coop. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". Invited seminar and workshop conducted at Dept. Entomology, Montana State University.

Aug. 2000. Iguassu Falls, Brazil. L. Coop, W. Bajwa, M. Kogan. "Online Application Server for Phenology Models and Maps". Poster presented at the XXIII International Congress of Entomology.

Dec. 1999. Atlanta, GA. L. Coop, W. Bajwa, and M. Kogan. "On-line phenology modeling and mapping using weather station networks, climate maps and GIS". Entomological Society of America, National Meetings.

Dec. 1999. M. Kogan, L. Coop, and W. Bajwa. Wenatchee, Washington. "Extending the principles and lessons learned

outside the project and to other commodities". In: "Areawide Program for Suppression of Codling Moth: Summary of the Effect of 5 years of Control". Washington Horticultural Association Annual Meeting.

Nov. 1999. Yakima, WA. Areawide Codling Moth Research Reports. Presentation entitled "Update on Online weather data and phenology models for areawide codling moth management".

May. 1999. The Dalles, Oregon. "Introduction to online phenology models for IPM decision support", IPM workshop with Cherry producers.

April. 1999. Corvallis, Oregon. "Online IPM Decision Support". IPM in Oregon Conference 1999: Achievements and Future Directions.

Feb. 1999. Corvallis, Oregon. "Introduction to online Phenology Models". OSU Entomology Dept. Seminar.

Dec. 1998. Portland, Oregon. Portland Parks/Recreation Pesticide Applicators Recertification Class, Presentation titled "IPM on the World Wide Web".

Oct. 1998. Corvallis, Oregon. Areawide Codling Moth Research Reports. Presentation entitled "Online weather data and phenology models for areawide codling moth management".

Oct. 1996. Niamey, Niger. CILSS/DFPV Workshop/Conference. Served as trainer and presented 2 papers on millet crop loss assessment techniques.

Sept 11, 1996. Corvallis, Oregon. Co-sponsored a workshop "Interactions between the phenology of biocontrol organisms and climatic conditions" for "IPM in Oregon for the 90's and Beyond", organized by the Integrated Plant Protection Center, OSU.

Nov 21-Dec. 18, 1995. Jaboticabal, Brazil. Organized and conducted a 3-week graduate level class "Systems modeling for IPM" at Sao Paulo State University, Campus of Jaboticabal.

Nov. 8, 1995. Raleigh, NC. Represented Oregon State University at the second meeting of the National IPM Network.

Sept 11, 1995. Corvallis, Oregon. Conducted a workshop "Computer Applications in IPM" for "IPM in Oregon for the 90's and Beyond", organized by the Integrated Plant Protection Center, OSU.

April 7-9, 1994. Dakar, Senegal. Presented a paper entitled 'Developing Economic Injury Levels for Grasshopper Pests of Millet' at the Sahel IPM Conference.

July 14, 1993. Medford, Oregon. International Pear Research Conference. Presented a paper entitled 'Geographic information systems and simulation in regional orchard management: pesticide resistance in Hood River Valley, Oregon'.

June 29, 1993. Portland, Oregon. Entomological Society of America (ESA) regional meetings. Presented a paper entitled 'Pear psylla resistance patterns and geographic information systems'.

Dec. 5-10, 1992. Baltimore, MD. ESA national meetings. Presented a paper entitled 'Grasshopper damage to pearl millet in Mali, West Africa'.

Dec. 6-10, 1991. Reno, Nevada. ESA national meetings. Presented a poster display entitled, 'Crop Loss Assessment and Decision Tools for Grasshoppers in Sub-Saharan Africa'.

Aug. 3-Oct. 18, 1991. Mali, West Africa. Directed second year of project, Crop Loss Assessment and Improved Decision Tools for Grasshopper Control in the Sahel. Survey of pest and crop in eight villages, a yields and harvest crop loss assessment, and cage experiments to determine millet damage rates by five grasshoppers species. Supervised project personnel including one American Entomologist (MS), one Senegalese Entomologist (PhD), two Malian Agronomists (MS), and three Malians for language interpretation/field work.

July 8-12, 1991, Corpus Christi, Texas. International Sorghum/Millet INTSORMIL CRSP conference. Presented two

poster displays: 1. Crop loss assessment in millet. 2. Millet pest damage recognition.

March 16-28, 1991. Ouagadougou, Burkina Faso, West Africa. Participated in USAID sponsored colloquy, 'Millet crop loss assessment: A colloquy on the current state of knowledge'.

1. 45 minute talk entitled 'The adjusted-length crop loss assessment method, with emphasis on USAID-funded research done in Gambia, Senegal, Mali and Chad, 1980-90'.

2. 45 minute talk entitled 'Crop loss assessment research on millet near Mourdiah, Mali'.

3. 25 minute talk entitled 'Analysis of grasshopper control in the Sahel: GHLSIM model'.

4. Poster display entitled 'Damage recognition and assessment for pests of millet'.

Aug. 27-Oct 12, 1990. Mali, West Africa. Continue supervision of crop loss assessment project. Sampling of grasshoppers and millet, crop loss assessment, cage experiments on effects of grasshoppers and Meloidae to millet spikes.

June 18-July 5, 1990. Mali, West Africa. Supervise field research program in crop loss assessment of millet. Monitored crops and pest injury in 9 villages.

May 1990, Corvallis, Oregon. Departmental seminar entitled 'Analysis of grasshopper control in the Sahel'. Oregon State University Department of Entomology.

Jan. 1990. Honolulu, Hawaii. Participated in a workshop entitled 'Modeling pest-crop interactions' organized by USAID-sponsored International Benchmark Sites Network for Agrotechnology Transfer. Presented paper GHLSIM: Sahelian grasshopper/crop loss simulation.

## **GRADUATE AND UNDERGRADUATE TEACHING EXPERIENCE**

Member of Graduate Faculty of OSU, Dept. of Entomology. Beginning 1995

Guest Lecturer, ENT 420/520. Principles of Insect Ecology, Winter Term 2002.

Assistant Instructor, ENT 442. Principles of IPM: Systems Design, Winter Term 1999, 2000, 2001.

Instructor, ENT 312/443. Use of computers in IPM, Winter Term 1998.

Assistant Instructor, ENT 443. Systems Pest Management Laboratory, Winter Term 1997.

Guest Lecturer, USDA - OSU/IPPC IPM Shortcourse, July 1991, 92, 93, and 94.

Guest Lecturer, Intro IPM ENT 311, 1987, IPM II ENT 443, 1984-87, 1990, 1995.

Laboratory Instructor, IPM I ENT 441 & IPM III ENT 444, 1983-84.

Guest Speaker on insects; kindergarten, third and fourth grade elementary classes, Briarwood Elementary school, 1983, 1984, 1989, 1992, 1999, 2009, 2010.

Laboratory Assistant, Baker University, 1977-79: General Biology, General Zoology, General Botany, Invertebrate Zoology.

Volunteer Assistant, OSU Entomology Museum Days (public showcase of insects from around the world) 1996, 2001

## **REFERENCES**

Current and former supervisors may be contacted. A list of additional references will be provided upon request.