

Journal of Economic Entomology

VOLUME 106

FEBRUARY 2013

NUMBER 1

FORUM

- Demographic Analysis, a Comparison of the Jackknife and Bootstrap Methods, and Predation Projection: A Case Study of *Chrysopa pallens* (Neuroptera: Chrysopidae).
LING-YUAN YU, ZHEN-ZHEN CHEN, FANG-QIANG ZHENG, AI-JU SHI, TING-TING GUO,
BAO-HUA YEH, HSIN CHI, AND YONG-YU XU 1

APICULTURE AND SOCIAL INSECTS

- Sublethal Effects of Paichongding on *Nilaparvata lugens* (Homoptera: Delphacidae). **PDF** *
XIAOWA QIN, JIE ZHANG, QI LIU, YONG CHEN, AND RUNJIE ZHANG 10

ARTHROPODS IN RELATION TO PLANT DISEASE

- Dissecting the Mode of Maize Chlorotic Mottle Virus Transmission (Tombusviridae: Machlomovirus) by *Frankliniella williamsi* (Thysanoptera: Thripidae).
D. CABANAS, S. WATANABE, C.H.V. HIGASHI, AND A. BRESSAN 16
- New Excised-Leaf Assay Method to Test Inoculativity of Asian Citrus Psyllid (Hemiptera: Psyllidae) With *Candidatus Liberibacter asiaticus* Associated With Citrus Huanglongbing Disease. **PDF** *
EL-DESOUKY AMMAR, ABIGAIL J. WALTER, AND DAVID G. HALL 25

BIOLOGICAL AND MICROBIAL CONTROL

- The Effect of Gamma Sterilization on the Insecticidal Toxicity of Engineered and Conventional *Bacillus thuringiensis* Strains.
SHIFENG SUN, JING FAN, ZHONGSHAN CHENG, YI CAI, GUANGHONG LI, AND YI PANG 36
- The Identification of a Bacterial Strain BGI-1 Isolated From the Intestinal Flora of *Blattella Germanica*, and Its Anti-Entomopathogenic Fungi Activity.
Y. H. HUANG, X. J. WANG, F. ZHANG, X. B. HUO, R. S. FU, J. J. LIU, W. B. SUN,
D. M. KANG, AND X. JING 43
- Insecticidal Characteristics of Two Commercial *Spodoptera exigua* Nucleopolyhedrovirus Strains Produced on Different Host Colonies. **PDF** *
SONIA ELVIRA, M. ANGELES IBARGUTXI, NOELIA GORRIA, DELIA MUÑOZ, PRIMITIVO CABALLERO, AND TREVOR WILLIAMS, 50
- Efficacy of a Granular Formulation Containing *Metarhizium brunneum* F52 (Hypocreales: Clavicipitaceae) Microsclerotia Against Nymphs of *Ixodes scapularis* (Acari: Ixoididae). **PDF** *
ROBERT W. BEHLE, MARK A. JACKSON, AND LINA B. FLOR-WEILER 57
- Investigating Alternatives to Traditional Insecticides: Effectiveness of Entomopathogenic Fungi and *Bacillus thuringiensis* Against Citrus Thrips and Avocado Thrips (Thysanoptera: Thripidae).
DEANE K. ZAHN AND JOSEPH G. MORSE 64

Biology and Efficacy of <i>Aprostocetus</i> (Eulophidae: Hymenoptera) as a Parasitoid of the Blueberry Gall Midge Complex: <i>Dasineura oxycoccana</i> and <i>Prodiplosis vaccinii</i> (Diptera: Cecidomyiidae). PDF *	
BLAIR J. SAMPSON, CRAIG R. ROUBOS, STEPHEN J. STRINGER, DONNA MARSHALL, AND OSCAR E. LIBURD.....	73
Biological Control of <i>Eotetranychus lewisi</i> and <i>Tetranychus urticae</i> (Acari: Tetranychidae) on strawberry by four phytoseiids (Acari: Phytoseiidae).	
ANNA D. HOWELL AND OLEG DAUGOVISH.....	80

ECOLOGY AND BEHAVIOR

Reproductive Dormancy in Boll-Weevil From Populations of the Midwest of Brazil. D. P. PAULA, D. CLAUDINO, R. V. TIMBÓ, J. E. MIRANDA, M. P. BEMQUERER, A.C.J. RIBEIRO, E. R. SUJII, E.M.G. FONTES, AND C.S.S. PIRES	86
Wild Bees Visiting Cucumber on Midwestern U.S. Organic Farms Benefit From Near-Farm Semi-Natural Areas. PDF *	
A. A. SMITH, M. BENTLEY, AND H. L. REYNOLDS	97
Effect of Temperature on the Development of <i>Laodelphax striatellus</i> (Homoptera: Delphacidae). LIUFENG WANG, PEIJIAN SHI, CHAO CHEN, AND FANGSEN XUE.....	107
Effect of Temperature and Button Mushroom Varieties on Life History of <i>Lycoriella auripila</i> (Diptera: Sciaridae). NAJMEH SHIRVANI FARSANI, ABBAS ALI ZAMANI, SAEID ABBASI, AND KATAYOON KHERADMAND.....	115
Temperature-Dependent Egg Development of <i>Lygus hesperus</i> (Hemiptera: Miridae). PDF *	
W. RODNEY COOPER AND DALE W. SPURGEON	124

ECOTOXICOLOGY

Toxicity and Repellency of Compounds From Clove (<i>Syzygium aromaticum</i>) to Red Imported Fire Ants <i>Solenopsis invicta</i> (Hymenoptera: Formicidae). LEKHNATH KAFLE AND CHENG JEN SHIH.....	131
Safety Evaluation of Eleven Insecticides to <i>Trichogramma nubilale</i> (Hymenoptera: Trichogrammatidae). XIAOFENG CHEN, MIN SONG, SUZHEN QI, AND CHENGJU WANG.....	136
Susceptibility to Selected Insecticides and Risk Assessment in the Insect Egg Parasitoid <i>Trichogramma confusum</i> (Hymenoptera: Trichogrammatidae). YANHUA WANG, LIPING CHEN, XUEHUA AN, JINHUA JIANG, QIANG WANG, LEIMING CAI, AND XUEPING ZHAO	142
Impact of Insecticide Residue Exposure on the Invasive Pest, <i>Halyomorpha halys</i> (Hemiptera: Pentatomidae): Analysis of Adult Mobility. PDF *	
DOO-HYUNG LEE, STARKER E. WRIGHT, AND TRACY C. LESKEY.....	150
Acute Toxicity of Plant Essential Oils to Scarab Larvae (Coleoptera: Scarabaeidae) and Their Analysis by Gas Chromatography-Mass Spectrometry. CHRISTOPHER M. RANGER, MICHAEL E. REDING, JASON B. OLIVER, JAMES J. MOYSEENKO, NADEER YOUSSEF, AND CHARLES R. KRAUSE.....	159

FIELD AND FORAGE CROPS

Abundance and Distribution of Western and Northern Corn Rootworm (<i>Diabrotica</i> spp.) and Prevalence of Rotation Resistance in Eastern Iowa. MIKE W. DUNBAR AND AARON J. GASSMANN.....	168
--	-----

- Effects of Chlorantraniliprole and Thiamethoxam Rice Seed Treatments on Egg Numbers and First Instar Survival of *Lissorhoptrus oryzophilus* (Coleoptera: Curculionidae). **PDF** *
S. K. LANKA, J. A. OTTEA, J. M. BEUZELIN, AND M. J. STOUT 181
- Verde Plant Bug (Hemiptera: Miridae) Feeding Injury to Cotton Bolls Characterized by Boll Age, Size, and Damage Ratings. **PDF** *
J. SCOTT ARMSTRONG, MICHAEL J. BREWER, ROY D. PARKER, AND J. J. ADAMCZYK, JR...... 189
- Effects of Nitrogen Fertilizer and Magnesium Manipulation on the *Cnaphalocrocis medinalis* (Lepidoptera: Pyralidae).
LIN-QUAN GE, DON-JU WAN, JIE XU, LI-BEN JIANG, AND JIN-CAI WU..... 196

FOREST ENTOMOLOGY

- Attaching Lures to Multiple-Funnel Traps Targeting Saproxylic Beetles (Coleoptera) in Pine Stands: Inside or Outside Funnels? **PDF** *
DANIEL R. MILLER, CHRISTOPHER M. CROWE, BRITTANY F. BARNES, KAMAL J. K. GANDHI, AND DONALD A. DUERR 206
- Reproductive Traits of *Glenea cantor* (Coleoptera: Cerambycidae: Lamiinae).
WEN LU, QIAO WANG, MING-YI TIAN, JIN XU, JIAN LV, SUI-GAI WEI, AND AI-ZHI QIN..... 215
- Population Densities and Tree Diameter Effects Associated With Verbenone Treatments to Reduce Mountain Pine Beetle-Caused Mortality of Lodgepole Pine. **PDF** *
R. A. PROGAR, D. C. BLACKFORD, D. R. CLUCK, S. COSTELLO, L. B. DUNNING, T. EAGER, C. L. JORGENSEN, A. S. MUNSON, B. STEED, AND M. J. RINELLA 221
- Cone and Seed Pests of *Pinus pinea*: Assessment and Characterization of Damage.
MATTEO BRACALINI, STEFANO BENEDETTELLI, FRANCESCO CROCI, PERLA TERRENI, RIZIERO TIBERI, AND TIZIANA PANZAVOLTA 229
- Sanitation Options for Managing Oak Wood Infested With the Invasive Goldspotted Oak Borer (Coleoptera: Buprestidae) in Southern California.
MICHAEL I. JONES, TOM W. COLEMAN, ANDREW D. GRAVES, MARY LOUISE FLINT, AND STEVEN J. SEYBOLD..... 235

HORTICULTURAL ENTOMOLOGY

- Efficacy of Pesticide Mixtures Against the Western Flower Thrips (Thysanoptera: Thripidae) Under Laboratory and Greenhouse Conditions. **PDF** *
AMY L. WILLMOTT, RAYMOND A. CLOYD, AND KUN YAN ZHU..... 247
- Control of Key Pecan Insect Pests Using Biorational Pesticides.
DAVID I. SHAPIRO-ILAN, TED E. COTTRELL, MARK A. JACKSON, AND BRUCE W. WOOD.... 257
- Pheromone-Based Action Thresholds for Control of the Swede Midge, *Contarinia nasturtii* (Diptera: Cecidomyiidae), and Residual Insecticide Efficacy in Cole Crops. **PDF** *
REBECCA H. HALLETT AND MARK K. SEARS 267
- Safety and Acquisition Potential of *Metarhizium anisopliae* in Entomovectoring With Bumble Bees, *Bombus terrestris*.
GUY SMAGGHE, LAURENS DE MEYER, IVAN MEEUS, AND VEERLE MOMMAERTS 277
- Host Plant Preference of Harlequin Bug (Hemiptera: Pentatomidae), and Evaluation of a Trap Cropping Strategy for Its Control in Collard. **PDF** *
ANNA K. WALLINGFORD, THOMAS P. KUCHAR, DOUGLAS G. PFEIFFER, DOROTHEA B. THOLL, JOSHUA H. FREEMAN, HÉLÈNE B. DOUGHTY, AND PETER B. SCHULTZ..... 283

Ethanol Injection of Ornamental Trees Facilitates Testing Insecticide Efficacy Against Ambrosia Beetles (Coleoptera: Curculionidae: Scolytinae). **PDF** *
MICHAEL E. REDING, JASON B. OLIVER, PETER B. SCHULTZ, CHRISTOPHER M. RANGER,
AND NADEER N. YOUSSEF..... 289

Do Weaver Ant (Hymenoptera: Formicidae) Marks Affect Mango Internal Quality and Storage Life? **PDF** *
RENKANG PENG AND KEITH CHRISTIAN..... 299

Attraction of Pollinators to Atemoya (Magnoliales: Annonaceae) in Puerto Rico: A Synergistic Approach Using Multiple Nitidulid Lures. **PDF** *
DAVID A. JENKINS, ANDREW R. CLINE, BRIAN IRISH, AND RICARDO GOENAGA..... 305

HOUSEHOLD AND STRUCTURAL INSECTS

Predicting Habitat Suitability of *Coptotermes gestroi* (Isoptera: Rhinotermitidae) With Species Distribution Models. **PDF** *
HOU-FENG LI, IKUKO FUJISAKI, AND NAN-YAO SU 311

Mulch Preferences of the Asian Cockroach (Dictyoptera: Blattellidae). **PDF** *
EDWARD T. SNODDY AND ARTHUR G. APPEL..... 322

International Field Trials of Pyrethroid-Treated Wood Exposed to *Coptotermes acinaciformis* in Australia and *Coptotermes formosanus* (Isoptera: Rhinotermitidae) in China and the United States.
J. W. CREFFIELD, M. LENZ, D. K. SCOWN, T. A. EVANS, J.-H. ZHONG, B. M. KARD, J.R.B. HAGUE, K. S. BROWN, E. D. FREYTAG, J. P. CUROLE, W. R. SMITH, AND T. F. SHUPE.... 329

Influence of Environmental Factors on Activity Patterns of *Incisitermes minor* (Isoptera: Kalotermitidae) in Naturally Infested Logs. **PDF** *
VERNARD R. LEWIS, SHAWN LEIGHTON, ROBIN TABUCHI, JAMES A. BALDWIN,
AND MICHAEL I. HAVERTY..... 338

Evaluation of an Insecticide Dust Band Treatment Method for Controlling Bed Bugs. **PDF** *
CHANGLU WANG, NARINDERPAL SINGH, RICHARD COOPER, CHAOFENG LIU,
AND GRZEGORZ BUCZKOWSKI..... 347

INSECTICIDE RESISTANCE AND RESISTANCE MANAGEMENT

Insecticide Toxicity to Oriental Fruit Fly *Bactrocera dorsalis* (Diptera: Tephritidae) is Influenced by Environmental Factors.
YUYING LIN, TAO JIN, LING ZENG, AND YONGYUE LU..... 353

Comparison of Pyrethroid Resistance in Adults and Larvae of *Culex pipiens pallens* (Diptera: Culicidae) From Four Field Populations in China.
HUI LIU, YUJIE LU, QIYONG LIU, XINBEI HUO, BO PENG, DONGSHENG REN, DANDAN WU,
JUN WANG, XUEJUN WANG, ZHENQIANG TANG, WEI LIU, AND FENGXIA MENG..... 360

Insecticide Resistance and Malaria Vector Control: The Importance of Fitness Cost Mechanisms in Determining Economically Optimal Control Trajectories.
ZACHARY S. BROWN, KATHERINE L. DICKINSON, AND RANDALL A. KRAMER..... 366

Current Status of Insecticide Resistance in *Helicoverpa armigera* After 15 Years of Bt Cotton Planting in China.
YIHUA YANG, YAPENG LI, AND YIDONG WU..... 375

- Risk Assessment for *Helicoverpa zea* (Lepidoptera: Noctuidae) Resistance on Dual-Gene Versus Single-Gene Corn.
**KRISTINE T. EDWARDS, MICHAEL A. CAPRIO, K. CLINT ALLEN,
 AND FRED R. MUSSER..... 382**
- Dynamic Insecticide Susceptibility Changes in Florida Populations of *Diaphorina citri* (Hemiptera: Psyllidae). **PDF** *
SIDDHARTH TIWARI, NABIL KILLINY, AND LUKASZ L. STELINSKI..... 393
- Survey of Resistance to Four Insecticides and their Associated Mechanisms in Different Genotypes of the Green Peach Aphid (Hemiptera: Aphididae) From Chile.
EDUARDO FUENTES-CONTRERAS, CHRISTIAN C. FIGUEROA, ANDREA X. SILVA, LEONARDO D. BACIGALUPE, LUCÍA M. BRIONES, STEPHEN P. FOSTER, AND THOMAS R. UNRUH..... 400

MOLECULAR ENTOMOLOGY

- Application of Cytochrome Oxidase I Sequences for Phylogenetic Analysis and Identification of Thrips Species Occurring on Vegetable Crops. **PDF** *
P. KADIRVEL, R. SRINIVASAN, YUN-CHE HSU, FU-CHENG SU, AND R. DE LA PEÑA 408
- Validation of the 16S rDNA and COI DNA Barcoding Technique for Rapid Molecular Identification of Stored Product Psocids (Insecta: Psocodea: Liposcelididae).
QIANQIAN YANG, SHUO ZHAO, ZUZANA KUČEROVÁ, VÁCLAV STEJSKAL, GEORGE OPIT, MENG QIN, YANG CAO, FUJUN LI, AND ZHIHONG LI 419
- Phylogenetic Analysis of the Alfalfa Weevil Complex (Coleoptera: Curculionidae) in North America.
**JORGE A. ACHATA BÖTTGER, C. SCOTT BUNDY, NAOMI OESTERLE,
 AND STEPHEN F. HANSON..... 426**
- Molecular Diagnosis of Populational Variants of *Anthonomus grandis* (Coleoptera: Curculionidae) in North America. **PDF** *
**NORMAN BARR, RAUL RUIZ-ARCE, OSCAR OBREGÓN, ROSITA DE LEON, NELSON FOSTER,
 CHRIS REUTER, THEODORE BORATYNSKI, AND DON VACEK 437**
- Molecular Cloning, Characterization, and mRNA Expression of Two *Cryptochrome* Genes in *Helicoverpa armigera* (Lepidoptera: Noctuidae).
SHUO YAN, HUI NI, HUITING LI, JING ZHANG, XIAOXIA LIU, AND QINGWEN ZHANG 450
- DNA-Based Identification of Spider Mites: Molecular Evidence for Cryptic Species of the Genus *Tetranychus* (Acari: Tetranychidae). **PDF** *
T. MATSUDA, C. FUKUMOTO, N. HINOMOTO, AND T. GOTOH..... 463

PLANT RESISTANCE

- Characterization of Antibiosis and Antixenosis to the Woolly Poplar Aphid (Hemiptera: Aphididae) in the Bark of Different Poplar Genotypes.
**SOPHIE POINTEAU, ARNAUD AMELINE, AURÉLIEN SALLÉ, STÉPHANIE BANKHEAD-DRONNET,
 AND FRANÇOIS LIEUTIER 473**

SAMPLING AND BIOSTATISTICS

- Pheromone-Based Monitoring of *Pseudococcus maritimus* (Hemiptera: Pseudococcidae) Populations in Concord Grape Vineyards. **PDF** *
B. W. BAHDER, R. A. NAIDU, K. M. DAANE, J. G. MILLAR, AND D. B. WALSH..... 482

STORED-PRODUCT

- Weight Loss and Germination Failure Caused by Psocids in Different Wheat Varieties. **PDF** *
S. G. GAUTAM, G. P. OPIT, K. L. GILES, AND B. ADAM 491
- Tribolium castaneum* (Coleoptera: Tenebrionidae) Associated With Rice Mills: Fumigation Efficacy and Population Rebound. **PDF** *
KARRIE A. BUCKMAN, JAMES F. CAMPBELL, AND BHADRIRAJU SUBRAMANYAM 499
- Evaluation of Repellency of Some Chinese Medicinal Herbs Essential Oils Against *Liposcelis bostrychophila* (Psocoptera: Liposcelidae) and *Tribolium castaneum* (Coleoptera: Tenebrionidae).
YAN LIANG, JIN LU LI, SHUAI XU, NA NA ZHAO, LIGANG ZHOU, JUN CHENG,
AND ZHI LONG LIU 513

SHORT COMMUNICATION

- Effects of Short Photoperiod on Codling Moth Diapause and Survival. **PDF** *
LISA G. NEVEN 520