Developing and Implementing Field and Landscape Level Reduced-Risk Management Strategies for Lygus in Western Cropping Systems

Interim Report on a Risk Avoidance and Mitigation Program grant

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Principle Investigators:

Each of the following are Principle Investigators in this project. They each have participated in one or more research studies associated with the RAMP as described in the project outcomes matrix available at http://cals.arizona.edu/apmc/docs/RAMP_Outcomes_2-19-09.pdf.

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Collaborators: Andrew Corbett (Veterinary Information Network), Pierre Dutilleul (McGill University), Bob Hutmacher (UC-Davis), M.J. Jimenez (UC-IPM), David Kerns (Texas A&M), R. Molinar (UC-IPM), Shannon Mueller (UC), Dale Spurgeon (USDA), Russ Tronstad (UA)

Partner Organizations:

Arizona Cotton Research and Protection Council
Arizona Pest Management Center
BASF
Bayer Crop Science
California Cotton Alliance
California Dry Bean Council
Cotton Incorporated Core Funding Program
Cotton Incorporated Texas State Support Committee
Cotton Incorporated California State Support Committee
Dow AgroScience
Dupont Corporation

FMC Corporation
Makhteshim-Agan of North America
National Institute of Food and Agriculture, Extension IPM program
New Mexico State University IPM Laboratory
Plains Cotton Growers, Inc.
Texas A&M Agrilife Research
University of Arizona Cooperative Extension
University of Arizona Maricopa Agricultural Center
University of California Davis, Dept. of Entomology
University of California Statewide IPM Program
UC Davis Agronomy Farm
UC Kearny Agricultural Center Geospatial Laboratory
UC Shafter Research and Extension Center
UC West Side Research and Extension Center
USDA Agricultural Research Service
USDA ARS Arid Lands Agricultural Research Center
USDA International Cotton Research Center
U.S. Environmental Protection Agency
Valent Corp, USA
Van den Bosch Foundation
Western IPM Center
Yulex Corporation
Yuma Agricultural Center, University of Arizona
USDA Agricultural and Food Research Initiative program
USDA National Research Initiative program

Training:

Researchers presented results of RAMP studies at least 35 times including workshops, grower meetings and field days reaching hundreds of clientele in AZ, CA, NM and TX.

Target Audiences:

Professional Pest Control Advisors (PCAs), growers, agricultural industry representatives, Cooperative Extension, pesticide regulatory agencies, entomologists, IPM practitioners, Land Grant & USDA colleagues.

Outputs

* Conducted at least 12 field and 3 lab experiments related to field-level Lygus damage to crops (cotton, seed broccoli, dry beans, chiles, eggplant, lesquerella, guayule) in CA, AZ, NM and TX. Analyses of experimental data from previous years are in various stages of completion.

* Conducted at least 11 field experiments related to determining insecticide efficacy, timing, and effect on natural enemies in cotton and dry beans in AZ, CA and TX. This included experiments

to determine deployment options for selective reduced-risk Lygus control compounds and impact of control strategies on natural enemies.

* 3 large multi-faceted landscape level studies were conducted over large regions in 3 states (AZ, CA, TX), including over 150 cotton fields and surrounding crops, covering about 2,600 sq. miles, to determine Lygus presence and movement among crops and non-crop areas. Data analyses on 2007-08 data continued. GIS crop maps developed for AZ and in progress for CA & TX.

* Conducted field and lab experiments to elucidate the role of Geocoris, a Lygus predator, on cotton fruit retention and Lygus thresholds in cotton.

* Continued lab and field studies to characterize Lygus feeding and flight behaviors.

* Data analysis from NM on Lygus economic injury of cotton and plant bug injury to chile peppers nearly complete; Two Extension Bulletins in draft form.

* Published updated UC pest management guidelines for Lygus control in dry beans; updated guidelines for Lygus control in eggplant now in peer review.

* RAMP PIs Published 9 peer-reviewed articles with 9 more submitted or in preparation; 1 book chapter; 9 non-refereed proceedings articles; 3 popular press and 25 online and print Extension articles since last report.

* Researchers presented research results to end users at least 35 times including workshops, grower meetings and field days reaching hundreds of clientele in AZ, CA, NM and TX and delivered at least 34 presentations to peers at regional, national and international conferences.

* Published 8 online newsletters with Lygus updates for Texas growers during 2009 field season; over 10,000 downloads so far in 2009. Research info distributed to over 1,400 subscribers.

* Held RAMP Project Partners Meeting during June 2009 in Maricopa, Arizona. PIs and collaborators presented and discussed research findings, linkages across projects, and planned for completion and extension of RAMP results to clientele in year 4. More information, presentations and detailed research result updates are available at http://cals.arizona.edu/apmc/partner_meeting.html.

* Updated Lygus & RAMP information on project webpage (http://cals.arizona.edu/apmc/RAMP.html) and 2 related websites. Created web pages for June 2009 Lygus RAMP PI meeting and for RAMP outputs and publications.

* Used RAMP listserv for ongoing communication among project partners.

* Collected Lygus Management Survey data at 8 mtgs in AZ (55), CA (18) and TX (24) with about 90 responses.

* Initiated contact with the larger community of Lygus scientists worldwide to determine the need, interest and potential locations for the 3rd International Lygus Symposium, and formed a steering committee.

Outcomes and Impacts

* In TX, significant changes have been implemented in Lygus sampling procedures and insecticide use in cotton as a direct result of RAMP research. Overall, producers and consultants there have increased their knowledge of Lygus biology, behavior and ecology and more are scouting and adopting university thresholds and drop cloth sampling methods. Prior to RAMP research, consultants did not manage Lygus in late season cotton; RAMP data indicating the importance of late season management have increased clientele awareness and improved late season management of Lygus.

* Crop consultants in NM are scouting more closely for Lygus and its damage in cotton.

* CA growers reduced insecticide use on cotton by managing Lygus in neighboring non-crop hosts.

* Pest Control Advisors (PCAs) have improved knowledge of Lygus damage on lettuce in AZ and CA.

* Carbine adoption in CA has greatly increased, in part due to efficacy studies and outreach conducted through the RAMP. At the same time, pyrethroid use has greatly declined, allowing growers to benefit from increased natural enemy activity.

* In TX, Carbine has become the standard product for Lygus control in cotton and secondary pest outbreaks have greatly decreased.

* When sprays for L. hesperus were needed in AZ in 2008, 93% of cotton fields were treated with Carbine, reducing secondary pest outbreaks by conserving natural enemies. Through studies developed under the RAMP, growers were advised to use Carbine as a selective Lygus control agent before using any other less selective product, and more than 80% of first sprays for Lygus were in fact Carbine.

* Detailed user surveys in central AZ (2008) showed the following behaviors: 45% of sprays in cotton were directed at Lygus as the sole target, showing it to be tied with whiteflies (47%) as the most important pest there; Carbine was the most frequently used insecticide for Lygus control, and was used 3 times more than the broad-spectrum alternative, acephate. 66% of all Lygus sprays made and 72% of all fields requiring a Lygus spray used Carbine at least once.

* RAMP efficacy studies are supporting new product registrations in dry beans that are in process in CA (Steward (indoxacarb) and Carbine (flonicamid).

* Data generated in various field studies in Arizona on chemical efficacy and non-target effects will likely play a significant role in the registration of clothianiden (Belay) in cotton for Lygus control, and will provide Arizona with a potentially partially selective agent for the control of Lygus, minimizing risks of resistance, secondary pest outbreaks and pest resurgence. Given the lost prospect for metaflumizone, this registration (expected in January 2010) will be critical to our growers as a rotational alternative to the Carbine.

* As a result of trainings, field days cooperative research, more TX growers are now knowledgeable of Lygus intercrop movement behavior and timing of Lygus severity in cotton as affected by adjacent crops and non-crop habitat.

* Leveraged an estimated $714,984 in grants and gifts this reporting period, about $1,586,000 cumulatively throughout the project term.

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Project Modifications

Collaborator Andrew Corbett's role in the project to develop a Lygus gaming simulation has been reduced. He will not longer be the primary developer for this project. Instead, we have developed an open call for proposals and have solicited potential vendors. These proposals will be reviewed in early December 2009, after which the game development team will move forward with the selected vendor. Andrew Corbett will remain involved as a consultant on the project.