RAMP OUTCOME TRACKING MATRIX: Updated Nov 30, 2007.							
Investigators	**Project Title**	**Objectives**	**Research Activities**	**Education Activities & Products**	**Measurements**	**Impact "nuggets" / Success stories**	**Leveraged Resources**
SECTION I: Field Level Experimental: Yield/Damage/Thresholds							
Ellsworth AZ cotton, 1 data analysis project, 1 grower demo / field day held (6 reached); presentation at cotton beltwide conf. (200 growers and 200 PCAs reached)	Development of dynamic, yield : density relationships for terminating chemical control in cotton	1. Analyze 4-yrs of Lygus chemical control termination data. 2. Establish rules and/or guidelines for decision-making with respect to Lygus control termination. 3. Establish grower-demonstrations to both test, verify, and validate decision rules. 4. Continue education on the basic threshold guidelines for Lygus in cotton and the '15:4' concept of waiting until nymphs are present before initiating chemical controls.	1. All data have been assembled into a common database and prepped for analysis.	1. Invitation to PB-ESA symposium in 4/08 to present information on Lygus control termination and other aspects of Lygus management. 3a. One grower demonstration was conducted with reduced-risk compound and timing of Lygus control termination. 3b. One grower field day was held on-site of grower demonstration to teach about Lygus termination decisions. 3c. Plans are underway to conduct at least 3-5 Lygus demonstrations including chemical control termination in 2008 with area agents, PCAs, and growers. 4. Met with individual PCAs to discuss their Lygus controls decision-making.	Research data was presented to 50-60 international Lygus scientists at international meeting. Over 200 growers and PCAs in CA and another 200 PCAs from cotton states beltwide were shown the data and taught the concepts of Lygus control termination. Three agents, two growers, and one PCA were exposed directly to the concepts of Lygus control termination through grower demo.	One grower managed 1200 A of cotton late season with a reduced-risk insecticide based in part on this research and the pilot guidelines. Two PCAs reported using nymphs exclusively for timing Lygus chemical controls overturning a long-standing practice of spraying based on Total Lygus and/or adult Lygus counts only.	4-yrs of previous support from CI to help develop the experimental basis of this activity.

Parajulee 3 exp, TX, cotton	Boll Susceptibility window for L. hesperus in TX cotton	a) Developing a heat unit based boll susceptibility threshold, b) Evaluating boll susceptibility differences among commonly adopted cotton cultivars, c) Evaluating the effect of nitrogen on boll susceptibility window in high production potential drip planted cotton.	Conducted experiments in boll susceptibility thresholds based on heat units, cultivars, and nitrogen inputs. Conducting data analysis and developing regression models that will lead to management recommendations.	Outcome not available yet. (Presentations at grower meetings are planned next spring and publications will be prepared after 2 years of data collection.)		25K from Cotton Incorporated Texas State Support Committee
Bundy 1 exp, NM, cotton, 2 presentations, 125 reached	Economic injury evaluations for Lygus in New Mexico Cotton	(a) Develop an Economic Theshold for Lygus hesperus on cotton in New Mexico. (b) Create an extension bulletin to communicate these thresholds to our clientele. (c) Disseminate new information via grower meetings, etc.	Research plots were established and data are being analyzed. Results from this year will be used to fine-tune a preliminary threshold developed from earlier studies.	A preliminary Lygus threshold (based on preliminary work) will be released later this year, the first such information available in NM. Data will be further disseminated later in 2007 and beyond.	Preliminary data presented at Beltwide Cotton Conference 2007. Data on Lygus presented at NM State Cotton Grower's Conference (100-150 attended).	CI grant support ($9000). Personnel support from NMSU IPM Laboratory
Parajulee 3 exp, TX	Compensation of Lygus and fleahopper-induced fruit loss in cotton	a) Quantifying compensation of Lygus-induced fruit loss in pre-flower and early flower cotton under limited-irrigation production, b) Quantifying compensation of Lygus-induced fruit loss in pre-flower and early flower cotton under high input drip irrigation production system, c) Comparing the compensation potential of cotton in limited versus full irrigation after cotton fleahopper-induced square loss.	Conducted 3 sets of expeiments that will collectively provide information to growers in determining the level and timing of Lygus/fleahopper infestation that cotton plants can tolerate without having to treat with insecticides. Data analysis will be completed following harvest.	(Outreach seminars are planned for late February 2008 to disseminate the outcome of the first year results. Publications will be prepared after 2 years of data collection.)		25K from Cotton Incorporated Texas State Support Committee; 13K from Texas Tech University; 20K from Cotton Incorporated Core Funding Program

Goodell, Hutmacher & Godfrey CA, 2 meetings (56 reached), 155 newsletters distributed, 185 web downloads	Strengthening research and extension for Pima cotton	(1) Pima cotton pest management guidelines will be developed along with information on plant growth and phenology. (2) Information will be delivered through the existing Cotton Extension Team via meetings, field days and workshops. (3) Cotton Pest Management Guidelines will be expanded to include information specific to Pima cotton.	None.	(1) General cotton production meetings including Pima cotton (2 in summer 2007); (2) Weekly updates on Lygus situatin via MiteFax; (3) Cotton Field Check (newsletter) published as needed Lygus update, 6/20/07 http://cottoninfo.ucdavis.edu/IMAGES/Field%20Check%20June%2007%20lygus.pdf	(1) 56 attended mtgs; (2) Number of Field Check Lygus Update delivered via MiteFax: 155; (3) Field Check Lygus Update web downloads: 185.	$6,500 Cotton Inc.; $5,000 UC Statewide IPM Program
Rosenheim (Ellsworth collaborator) 1 exp, CA/AZ	Incorporating the key predator Geocoris into thresholds for Lygus control in cotton	Objective 1: To quantify the influence of Geocoris spp. on Lygus egg, nymphal, and adult survival and on cotton fruit production. Objective 2: To modify existing control recommendations to incorporate knowledge of Geocoris spp. densities.	We are currently conducting a field experiment examining effects of Geocoris spp. on Lygus densities and cotton growth and yield. We are assembling Geocoris data from past samples stored from prior investigations of Lygus thresholds and chemical controls.			
Palumbo 2 exp, AZ, broccoli seed, romaine lettuce	Lygus economic status and control in low desert vegetables and vegetable seed production	Objective 1: To deteremine the damage potential of Lygus and other seed feeding heteropterans on brassica seed crops. Objective 2: To monitor Lygus activity and document associated damaage on lettuce and other leafy vegetables.	We planneed and established an efficacy trial on a broccoli seed crop with a cooperative grower. We collected information on aphid control and damage, but were unable to collet data on Lygus, which did not become present during the crop season last year. This past fall we observed and monitored Lygus hesperus activity on a romaine lettuce block and documented and described their feeding damage.	Took digital images from experimental romaine field for an electronic bulletin we plan to prepare to describe Lygus damage to fall romaine lettuce under desert growing conditions. Worked with a Pest Control Advisor in diagnosing and describing Lygus damage to "organic" lettuce.		

Godfrey 3 exp., CA, dry beans, 2 field day trianings (30 reached)	Refining pest management guidelines for Lygus in dry beans	(a) evaluate the relationship between lygus bug numbers and dry bean production - yield and quality, (b) study the effects of application timing and intensity on dry bean production - yield and quality, (c) evaluate the effects of bean architecture on lygus bug sampling efficiency using the standard sweep net method, (d) modify existing thresholds as warranted based on results, (e) modify UC Pest Management Guidelines.	Field experiments to address this objective were conducted this year under low-moderate Lygus bug pressures. Results are forthcoming.	Study goals and details were conveyed to growers at 2 field day trainings this year. (25-35 attended; no results yet.)	UC-Davis Agronomy Farm and at the UC Shafter Research and Extension Center land resources and personnnel input
Bundy 3 exp., NM	Plant bug injury to chile peppers	(a) Determine timing of plant bug injury to chiles. (b) Develop detailed descriptions of plant bug damage to chiles. (c) Determine impact of Lygus feeding on chile pepper yield. (d) Develop a threshold for Lygus on chile in NM. (e) Develop an extension bulletin to communicate thresholds. (f) disseminate data via growers meetings, etc. (g) Data will contribute to a separate RAMP project on source potential for landscape spatial assessments.	A preliminary evaluation of Lygus feeding on chile is in progress for 2007. A complete field study will be completed in 2008-2009.	(a-f) Nothing yet. (An extension bulletin will be created to present research findings to the public.)	Personnel support from NMSU IPM Laboratory

Goodell, Molinar, Jimenez 0 exp.	Developing pest management guidelines for Lygus in eggplant	(1) This project will provide fresh market eggplant with rational Lygus action thresholds. Currently, fieldmen use a combination of visual count (bugs seen per plant) and blossom drop. These farm based thresholds will be the starting point for evaluating thresholds. (2) Evaluate a range of thresholds and incorporate into a Pest Management Guideline. As part of the Guideline, a Year Round IPM plan will be delivered. (3) A more comprehensive Pest Management Guideline for eggplant (UC IPM Pest Management Guideline series, www.ipm.ucdavis.edu) will be developed including Lygus management guidelines. (4) UCIPM Publications and Education is supportive of this Guideline and will provide delivery through its website as soon as it is available. It will also be linked to the ACIS.	None.	None	None	UC Statewide IPM Program - $ 5,000

Naranjo & Ellsworth 2 exp (field & lab), AZ, 1 presentation (reached 55) Lesquerella	Yield / Damage : Density Relationships for Lygus spp. in Lesquerella	1. Determine the timing of plant bug injury to lesquerella 2) Determine the nature and extent of plant bug injury to lesquerella 3) Determine the impact of plant bug feeding on yield and oil quality of lesquerella, 4) Test a series of nominal thresholds along with an untreated check 5) Quantify the relationship between plant bug density and lesquerella yield and quality and use this information to determine economic threshold 6) Develop efficient sampling plans based on the sweep net.	Observational laboratory studies were used to quantify the feeding beyhavior of Lygus hesperus on lesquerella plant parts. Feeding patterns are supported by field studies where damge to flower buds and fuit are positively correlated with lygus bug density. In turn, damage to these structures led to negative correlations between yield and plant bug density, and between seed oil quantity and bug density.	Presented results of first year of studies to scientific and industry community at the 2nd International Lygus Symposium April 2007.	The international Lygus symposium was attended by about 50-60 scientists, extension specialists and industry representatives.	USDA-ARS' on-going investment to develop this crop. In-kind provision and management of experimental crop areas. ARS personnel support. **Crop chemicals provided by agrochemical industry.**
Naranjo & Ellsworth 2 exp (field & lab), AZ, 1 presentation (reached 55) Guayule	Yield / Damage : Density Relationships for Lygus spp. in Guayule	1. Determine the timing of plant bug injury to guayule 2) Determine the nature and extent of plant bug injury to guayule 3) Determine the impact of plant bug feeding on yield (biomass and latex quantity) of guayule, 4) Test a series of nominal thresholds along with an untreated check 5) Quantify the relationship between plant bug density and guayule yield (biomass and latex quantity) and use this information to determine economic threshold 6) Develop efficient sampling plans based on the sweep net.	Field survey studies demonstrate that lygus bugs are present and reproduce in guayule over an extended portion of the season. Observational laboratory studies were used to quantify the feeding beyhavior of Lygus hesperus on guayule plant parts. Field studies are in the planning stages to examine the relationshp between lygus bug density and guayule damage and yield.	Presented field survey results to scientific and industry community at the 2nd International Lygus Symposium April 2007.	The international Lygus symposium was attended by about 50-60 scientists, extension specialists and industry representatives.	Leveraged physical and field resources of the UA-MAC and Yulex Corporation who maintain the world's largest planting of guayule. ARS personnel support. **Crop chemicals provided by agrochemical industry.**
SECTION II: Field Level Experimental: Insecticide Efficacy/Selectivity						

Godfrey, Parajulee, Kerns 1 exp., cotton, CA, 5 fields days, 1 conference presentation, 210 reached	Evaluating efficacy of registered and experimental insecticides for Lygus management in cotton	(a) evaluate the efficacy of registered and experimental insecticides on lygus bug populations, (b) determine the optimal lygus bug life stage for control with various insecticides, (c.) determine the effects of registered and experimental insecticides on populations of non-target arthropods (natural enemies) within the cotton system, (d) evaluate any potential indirect effects, i.e.., flaring, of secondary pest populations following application of registered and experimental insecticides, (e) determine the plant response via plant mapping to lygus bug with registered and experimental insecticides, (f) monitor impacts of treatments and treatment regimes on cotton yields.	We are conducting field studies at the UC-West Side Research and Extension Center to address this objective. Lygus bug populations have been extremely high this season at this location. Results will be forthcoming.	Study results were presented at the Shafter Cotton Field Day (Sept 18, 40 attended), West Side Research and Extension Center Cotton Field Day (Sept 20, 75 attended), Cotton Inc Cotton Breeders Tour at West Side REC (Sept. 20, 30 attended), Shafter Bean Field Day (Aug., 30 attended) UC-Davis Bean Field Day (Aug., 30 attended), Statewide CAPCA conference (Oct. 29, Reno).		UC West Side Research and Extension Center land resources and personnel input, Cotton Incorporated State Support funding

Ellsworth 2 expts. In AZ cotton; 1 field day	Determination of deployment options for reduced-risk and other effective chemistry for Lygus control in cotton	1. Conduct small plot testing of new reduced-risk chemistries alone, in combination, and in rotation with other chemistry. 2. Conduct semi-commercial scale plot evaluations and grower demonstrations of reduced-risk chemistries.	1. 17 treatments and an UTC were examined in a small plot context. 3 experimental compounds, and 11 combinations and/or rotations of reduced-risk chemistry were contrasted to conventional standards. 2a. One large-scale demonstration was set-up, but Lygus failed to reach economic levels. 2b. One grower-cooperator trial demonstration was conducted with a key registered reduced-risk compound, flonicamid or Carbine.	2. A grower field day highlighted the attributes of reduced-risk chemistry.	Carbine was used by the majority of PCAs who had to manage Lygus in 2007, replacing the standard in Lygus control, acephate. Secondary outbreaks were rare as a result, and 2007 may prove to have had the fewest number of foliar insecticides used in cotton statewide.	$38K (in part) from CI, and $22K (in part) from ACGA in 2007; $40K (in part) from CI for 2008; ca. $29K from agrochemical industry as well as 80 A (ca. 15 lbs) of Carbine insecticide for grower use.

Godfrey 1 exp., dry beans, CA, 2 field days, 30 reached	Evaluating efficacy of registered and experimental insecticides for Lygus management in dry beans	(a) evaluate the efficacy of registered and experimental insecticides on lygus bug populations, (b) determine the optimal lygus bug life stage for control with various insecticides, (c.) determine the effects of registered and experimental insecticides on populations of non-target arthropods (natural enemies) within the bean system, (d) evaluate any potential indirect effects, i.e.., flaring, of secondary pest populations following application of registered and experimental insecticides.	We are conducting field studies at the UC-Davis Agronomy Farm and at the UC Shafter Research and Extension Center to address this objective. Lygus bug populations have been low-moderate this far. Results will be forthcoming.	Two field days were held to relay results to growers and affiliated personnel. Study details and goals were elaborated.	2 field days were held and attended by 25-25 people.	UC-Davis Agronomy Farm and at the UC Shafter Research and Extension Center land resources and personnnel input
McGuire	Development of a selective biopesticide for Lygus	This project objective has been dropped.	McGuire changed positions after the grant application was submitted and will not be participating in this project. This was an unfunded study and will not now be included in our outcomes.			

Naranjo & Ellsworth 1 exp., AZ, cotton, 1 presentation, 55 reached	Evaluation of the selectivity of reduced-risk approaches to Lygus control	1. Evaluate the effects of new (flonicamid, metaflumizone) and existing (acephate) insecticides for selective control of Lygus bugs in cotton relative to an untreated control. 2. Determine the population dyanmics of 20-25 species of native natural enemies relative to insecticide regime. 3. Determine the population dyancmis of Lygus bugs relative to insecticide regime. 4. Measure predator:prey ratios relative to insecticide regime 5. Analyze community level effects of insecticide regimes on natural enemies	A field experiment (Latin-square with four treatment regimes) was established in 2007 and threshold-based insecticide applications and measurement of pest and natural enemy populations are on-going.	Presented results of on-going field studies to scientific and industry community at the 2nd International Lygus Symposium April 2007. Non-target data were presented to ca. 35 USDA and other scientists in invited seminar (4/07), over 200 PCAs in CA in a series of 5 Extension meetings, and over 200 PCAs beltwide in mtg in Mexico, as well as ca. 40 PCAs in AZ at Desert Ag Conference.	The international Lygus symposium was attended by about 50-60 scientists, extension specialists and industry representatives.	(ca. $14k) Co-sponsorship by participating companies (e.g., BASF, Chemtura, FMC, Valent). USDA-ARS' on-going investment to develop improved systems for IPM of Lygus bugs. In-kind provision and management of experimental crop areas. ARS personnel support.
SECTION III: Landscape Level: Patterns, Processes and Mechanisms						

Blackmer & Naranjo (Bancroft) 1 series of lab expts.	Influence of biotic and abiotic factors on Lygus movement	(a) Evaluate effect of wind speed on takeoff and oriented flight relative to insect age, gender, and mating status. (b) Evaluate the effect of varying temperatures on flight performance, while holding relative humidity constant. (c) Evaluate the effect of varying relative humidity on flight performance while holding temperature constant. (d) Determine whether light intensity influences frequency and length of flights. (e) Determine whether population density and host suitability influences flight behavior. (f) Disseminate information at national and regional meetings. (g) Publish results in refeered journals	(a) Constructed new flight mills to assist in tethered flight studies. (b) Tested the response of more than 1,300 male and female lygus (1,3,5,7,9 and 11-d-old, mated and virgin) to varying wind speeds in a vertical flight chamber. (Data analysis in progress.)			Inhouse funding provided by CRIS Project # 5347-22620-017-00D
Hagler, Blackmer, Naranjo 1 series of field expts testing markers; 6 mark-recapture trials; lab assays of 14500 field samples. 2 presentations (Lygus mtg); 2 published abstratcts.	Intercrop movement of Lygus and natural enemies among cotton, lesquerella, guayule, alfalfa and weeds	OBJECTIVE 3c: (a) Use protein markers and an ELISA detection system for a mark-capture study to evaluate Lygus and natural enemy movement between cotton, lesquerella, guayule, and alfalfa.	(a) Conducted a series of field studies testing the efficacy (retention) of 3 protein marks on lygus' and lady bugs; (b) Conducted 6 separate, 1 week mark-capture trials from April thru August. Examined the dispersal of Lygus and naturual enemies between a cotton, lesquerella, guayule, and alfalfa agroecosystem; (3) Assayed over 14,500 insect samples for 3 separate protein markers (n=43,400 ELISAs).	(a) Presented 2 Lygus presentaions (JRH) at the 2nd Int. Lygus Symp. (b) Published abstracts in Journal of Insect Sci (In Press)	Methodology used to mark insects directly in the field provides avenues for dispersal reaserch that is not possible with conventional marking methods.	Leveraged physical, land management and personnel resources at the USDA-ARS, ALARC. Shared funding resources from in-house CRIS project.

Rosenheim, Hagler 3 field expts.	Long-distance dispersal of Lygus and crop colonization from native plant overwintering sites	Objective 1: To quantify the long-distance dispersal potential of Lygus hesperus. Objective 2: To assess the relative importance of different plant communities (agricultural and natural) as sources of Lygus colonizing cotton fields.	We have conducted three large scale mark-recapture experiments to quantify Lygus long-distance dispersal into cotton fields and out of alfalfa fields that are being harvested. Samples from these trials are still being processed, and some data analysis is underway. A fourh experiment to quantify the relative importance of safflower and alfalfa as sources for mid-season Lygus immigration pulses into cotton fields is in the planning stages.	(This experimental work will complement ongoing work on Lygus landscape ecology derived from analysis of a non-experimental data set derived from collaborating private consultants and farmers.)		Construction and analysis of this database are being supported by: USDA-NRICGP ($343,500), University of California Statewide IPM ($46,710), and Cotton Incorporated ($23,000).
Goodell 1 large-scale expt.; 3 mtg presentations (67 reached)	Documenting the value of alfalfa in the cotton ecosystem	(1) Documentation of the value and role of alfalfa management will be provided to the cotton community through the existing Cotton Extension team. (2) A bulletin will be developed for publication through UC ANR publications and provided as a free downloadable PDF document. Reprints will be made available for use at grower and consultants meetings and workshops. (3) This bulletin will outline the steps for using alfalfa hay as habitat refugia for IPM purposes. Information will also be distributed through presentations at meetings and through ACIS.	As part of RAMP Lygus migration field experiments, alfalfa was mapped relative to focal cotton fields, from which weekly Lygus samples were taken. The data will be analyzed to determine how important alfalfa is as a Lygus source for cotton.	(1) Value of alfalfa in managing and mitigating Lygus in an ecosystem was presented at three meetings in 2007. (2) Value of alfalfa in managing Lyugs was mentioned in Field Check (see above) in June 2007.	Meeting attendance: 67; Field Check downloads: 185.	

Corbett, Rosenheim (Bancroft) planning stages	A landscape-scale, research-level, simulation model for Lygus	Objective 1: To develop a spatially-explicit, yet simple, simulation model for Lygus to explore general landscape-scale quations and to inform research efforts.	The basic framework for a model has been designed and coded. Refinement will begin following the field season.				
Goodell Bancroft, Rosenhiem and Godfrey 1 large field expt., 2 mtg presentations (56 reached); 1 press pub.	Influence of surrounding crops on Lygus infestation in cotton	(1)The landscape in which cotton is produced will be examined for its propensity to develop and release Lygus. (2) Key crops to be studied include alfalfa (hay and seed), safflower, sugar beets and resident vegetation. (3) Work will be coordinated with other RAMP participants.	(1) 41 focal cotton fields were identified and sampled weekly (4 samples/field); (2) All crops within 1.5 miles were identified on a crop commodity map (GeoCortex GIS web server) and available as an ArcView shape file; (3) Significant field activities were recorded weekly (irrigation, harvesting, spraying, etc); (4) Border crops were sampled several times during the season to esimtate background Lygus densities; (5) Weekly samples counted and data have been inputted. Analysis in progress.	Results of sampling through mid August were presented at two production meetigs (Kern and Fresno Counties).	Meeting attendance: 56	"Studies measure localized movement of Lygus into SJV cotton." Cary Blake. Western Farm Press. Page 20.	(1) Cotton Incorporated $6,500; (2) UC Statewide IPM Program - $ 5,000

Parajulee 3 large scale field expts.	3A-Project XXIV: Influence of non-cotton hosts, host preference, and inter-crop movement of Lygus on landscape-level dynamics	a) Evaluate the influence of roadside alfalfa on Lygus population dynamics in adjacent cotton, b) Investigate the host preference of Lygus in a simulated field mosaic of cotton, sunflower, alfalfa, pigweed, and Russian thistle, c) Quantify the inter-crop movement of Lygus using protein markers	a) Large field experiment conducted at four study sites in Lubbock County, Texas. Lygus and associated arthropod predators were sampled from alfalfa strips and adjacent cotton. Data will be analyzed to establish the Lygus density in cotton as a function of Lygus density in alfalfa and the phenology (timing) of cotton and alfalfa, b) Host preference study conducted. Further studies may be conducted in the laboratory next year to quantify the reproductive fitness and growth potential of Lygus in selected hosts. c) Lygus activity in cotton and alfalfa have been monitored in protein marker experiments to quantify the inter-crop movement, behavior and timing of Lygus. Samples will be processed during late fall/early spring and the study will be repeated 2-3 more years.	(Outreach seminars are planned for late February 2008 to disseminate the outcome of the first year results.)	(Outcome not available yet, but presentations at grower meetings are planned next spring and publications will be prepared after 2 years of data collection.)	20K from Cotton Incorporated Core Funding Program for sub-objective c.

Carriere, Ellsworth, Dutilleul, Goodell and Parajulee Large scale field studies in 3 states, 2 presentations, 1 newspaper article.	Development of landscape-level pest management guidelines to reduce Lygus infestations in cotton	1. Describe association between distribution and abundance of Lygus habitats (crops of weed patches) and Lygus infestations in cotton fields in Arizona, California, and Texas. 2. Assess temporal constancy of above associations within and between growing seasons. 3. Based on data collected over 3 years, test whether Lygus outbreaks can be predicted in cotton fields.	(The first 2 years involve Lygus sampling in c.a. 50 cotton fields per region, GIS mapping of surrounding Lygus habitats, and statistical modeling of source sink associations. Third year of project involves testing empirically-derived model predicting Lygus outbreacks.) Approximately 50 cotton focal fields were selected in CA, AZ and TX and all crop and other vegetation were mapped within a 3-km radius. Focal fields and surrounding non-cotton areas were sampled weekly for Lygus and arthropod predator abundance. Data are being processed and analyzed.	Project was highlighted in local newspaper, in farmer field day, in 1 invited seminar, and in an Extension meeting in AZ (25 people). (Plans are underway to present information to AZ agents at in-service meetings and to growers and pest managers at extension meetings and field days.) (Guidelines developed from this study will be disseminated during year 4, and workshops will be conducted to illustrate how farmers can decisions on planting location of crops.)	The average area being sampled in each region of CA, AZ and TX is 878.6 miles or 1413.7 km.	NA.	GIS work in AZ partly supported by USDA-NRI and Arizona Cotton Research Protection Council.
SECTION IV: Extension/Outreach/Education/Evaluation							
Fournier and Reid 1 webpage, 1 listserv	Reaching Stakeholders with Project Outcomes: The Arizona Crop Information Site	(a) Develop a Lygus Project area of the ACIS website, to serve as a clearinghouse for project information, print resources, and presentations. (b) Establish email list for communicating with RAMP project partners. (c) Request educational products, publications, presentations, etc., from RAMP partners and post the website. (d) Inform end-users through existing ACIS email list; expand to include growers and PCAs from throughout the region.	n/a	(a) Created home page on the APMC site for Lygus RAMP project information. (b) Established email listserv for project partners and used it to communicate (c) no educational products collected yet; 1 plant bug presentation by Peter Ellsworth posted on ACIS. (d) As more products from research are available as publications, etc., we will post and inform end-users of these via email list.			Leveraged funds through the Arizona Pest Management Center for web development ($3,000)

Ellsworth 1 fld day (same as above)	On-farm demonstration and validation of Lygus reduced-risk technology and decision-making	(1) Conduct on-farm demonstrations to present reduced-risk technologies and decision-making concepts to growers and PCAs	n/a	A grower field day highlighted the attributes of reduced-risk chemistry and timing of Lygus control termination, using grower demonstration plots. (Plans are underway to conduct at least 3-5 Lygus demonstrations including chemical control termination in 2008 with area agents, PCAs, and growers.)	Three agents, two growers, and one PCA were exposed directly to the concepts of Lygus control termination through grower demo.
Ellsworth & Goodell 1 conference (beltwides, 200 PCA reached); 200 more PCAs reached in CA mtgs.	Teaching Lygus sampling techniques for cotton	(1) Conduct workshops, field days, mtgs, and one-on-one training of growers, PCAs, and others on proper detection and sampling techniques for Lygus in cotton. (2) Production of a video tutorial and pamphlet on the topic.	Sweep technique was standardized for research in spatially-explicit experiments in AZ and TX.	(1) Sweep technique was discussed and taught to over 200 PCAs beltwide in a mtg format, and well as to over 200 PCAs in CA in a series of small mtgs. Demonstration and one-on-one teaching done in TX with TX project leaders and technicians.	
Ellsworth, Corbett, Goodell, Rosenheim, Carriere (Tronstad, collaborator)	Grower training in group processes using gaming simulations of landscape processes & risk management	This is a year 3-4 objective.			

Ellsworth, Goodell et al. XX presentations by PIS on RAMP	Development of an international forum for Lygus scientific exchange	(1) Scientific exchange and outreach of the latest information about Lygus identification, biology, plant interactions, and management at the 2nd International Lygus Symposium; (2) bring together project participants as well as the greater scientific community concerned with the management of Lygus in multiple crops throughout North America and Europe. (3) Meeting will serve as forum for planning activities associated with this RAMP, e.g., the discussion and development of common protocols for implementing landscape sampling programs in three states. (4) Meeting will provide a platform for sharing results with scientific audience and for summarizing RAMP achievements.	n/a	(1) XX scientific presentations by RAMP participants on various aspects of their Lygus research. (2) Abstracts to be published in Journal of Insect Science. (3) RAMP planning session at the Lygus Symposium allowed PIs and collaborators to formalize plans for collaborative experiments, project communications, outreach and evaluation related to the RAMP effort.	Meeting attended by 50-60; XX number of abstracts published.

Fournier, Ellsworth, Goodell, Parajulee, Bundy, Godfrey	Evaluation of project Extension components and adoption of proposed Lygus management practices	(1) Develop methodology and instrument(s) for measuring changes in knowledge and behavior of end-users with respect to Lygus management; (2) implement measures at ongoing meetings, workshops, field days, etc., throughout the project; (3) analyze data to determine changes in knowledge and behavior and use and vale of Lygus resources as they are developed.	n/a	(1a) Met with evaluation project team in April to develop plan for evaluation of Extension activities across all 4 states; (1b) Developed and implemented a RAMP activities and outcomes tracking matrix to collect information from PIs on reearch and Extension activities; (1c) Developed draft General Evaluation Instrument (GEI) for measuring changes in end-user knowledge and behavior and use of existing resources; (2) This draft GEI is currently being revised and finalized and will be implemented at Extension meeting and other venues starting in 2008. (3) data analysis will occur after one year of data collection.