

February 8, 2013

Biennial CIOSU Review: Center for Sustainable Integrated Pest Management in Colorado

The application for the Center was submitted on 9/1/2010.

Current faculty and other personnel

- Dr. Deborah Young (community IPM, BSPM) – co-director
- Dr. Ned Tisserat (plant pathologist, BSPM) – co-director
- Dr. George Beck (weed scientist, BSPM)
- Ms. Genevieve Berry (community IPM, BSPM)
- Dr. Lou Bjostad (entomologist, BSPM)
- Ms. Tamla Blunt (diagnostics coordinator, BSPM)
- Mr. Bruce Bosley (IPM, Logan County Extension)
- Dr. Cynthia Brown, (ecologist, BSPM)
- Mr. Matt Camper (entomologist, BSPM)
- Dr. Whitney Cranshaw (entomologist, BSPM)
- Dr. Assefa Gebre-Amlak (entomologist, Weld County Extension)
- Dr. Thaddeus Gourd (IPM, Adams County Extension)
- Mr. Robert Hammon (IPM, Mesa County Extension)
- Dr. Bill Jacobi (plant pathologist, BSPM)
- Mr. Joe Julian (IPM, Douglas County Extension)
- Dr. Boris Kondratieff (entomologist, BSPM)
- Dr. Tony Koski (turf specialist, HLA)
- Dr. Steve Newman (horticulture specialist, HLA)
- Dr. Scott Nissen, (weed scientist, BSPM)
- Dr. Andrew Norton (entomologist, BSPM)
- Dr. Paul Ode (entomologist, BSPM)
- Dr. Frank Peairs (entomologist, BSPM)
- Ms. Jeannine Riess (environmental health specialist, CSU)
- Dr. Howard Schwartz, (plant pathologist, BSPM)
- Ms. Mary Small (IPM, Jefferson County Extension)
- Dr. Frank Stonaker (vegetable specialist, HLA)
- Ms. Thia Walker (pesticide safety specialist, BSPM)
- Dr. Phil Westra (weed scientist, BSPM)

Description of goals and objectives

The mission of the Center is to provide research and outreach in integrated pest management (IPM) practices for sustainable plant and animal agriculture, small and large farms, non-crop lands and waterways, households, landscapes, green industry, schools, buildings and communities that encourage the use of multiple and flexible strategies for the control of insect pests, plant pathogens, and weeds, and in some situations (such as within structures) rodents and other vertebrates.

The overarching goals of the Center are to provide a focal point and coordination of the numerous pest management efforts at Colorado State University and to facilitate communication among participants (both on campus and off) and external stakeholders.

Objectives and outputs achieved:

- Develop a research and outreach education program focused on sustainable and effective management practices that increase farm profitability, reduce environmental and human health risks and protect natural resources for future generations. The record of grants (\$4.3 million) and publications reflect the research and education programs. The Center website is <http://coloradoipmcenter.agsci.colostate.edu/>.
- Identify pest management needs and priorities in Colorado. This was accomplished through communication with Center advisory committee and with commodity-based advisory groups.
- Provide diagnostic and identification services of pest and beneficial insects, plant pathogens, and weeds. The Diagnostic Clinic received 440 samples (including 71 insect specimens, 133 wheat virus samples, and 236 samples with pathogens and/or abiotic problems) in 2012. Other samples were diagnosed directly by BSPM faculty, county Extension agents, and Master Gardeners and are not included in this number. Advanced training for Master Gardeners supported this objective; participants consistently rated training as “excellent”. At one training, for example, 93% of participants indicated that they would implement the knowledge provided at the workshop.
- Identify and secure support for research and outreach programs aimed at addressing pest management needs. \$4.3 million in research and outreach funds in integrated pest management was received as of December 2012.
- Evaluate and improve IPM programs and assess their impact on end-users and the environment. An example of program evaluation is the Advanced Diagnostic workshop for Master Gardeners. Workshop evaluations demonstrate a substantial increase in skills and knowledge (self-reported).
- Provide pesticide safety education and regulatory support of pest management tools through USDA/NIFA/NRSP-4 (IR-4), the Colorado Department of Agriculture and USEPA. The Colorado Pesticide Safety and Education Program (PSEP, Walker) provided workshops and regulatory support to 5,648 people during 2012. Funding from the

National Institute of Food and Agriculture (\$10,000) and the Colorado Department of Agriculture (\$28,300) provided program support.

- Enhance undergraduate and graduate education through collaborations with classroom teaching programs. Thirty different courses related to integrated pest management are taught by faculty.
- Promote partnerships focused on addressing pest management priorities in Colorado, EPA Region 8, and USDA's Western Region. Meetings and conference calls with USDA, Western IPM Center, Region 8 EPA, and national EPA were conducted.
- Provide liaison with USDA/NIFA/WERA-069: Coordination of Integrated Pest Management Research and Extension/Educational Programs for the Western States and Pacific Basin Territories. This WERA committee (now called WERA 1017) was reviewed and approved. The objectives are: (1) increase participants' skills, knowledge, and awareness of regional/national IPM issues, systems, and strategies (2) increase relevance of federal and regional IPM RFAs, programs, and policies to better align them with regional stakeholder needs; (3) Enhance collaboration, sharing of ideas, and hence creation of regional outputs such as multi-state grants and shared outreach materials; and (4) Improve coordination of IPM programs that address on-going, emerging and other critical pest and related environmental issues. Young attended the 2011 and 2012 WERA meetings.
- Coordinate interactions with USDA/NIFA Extension IPM program and CSU Extension Pest Management Work Team. A plan of work is updated annually for pest management (Schwartz and Gourd). There is a long-term need for a comprehensive, high quality integrated pest management system encompassing the disciplines of entomology, plant pathology and weed science. This plan supports Center goals through efforts to better serve stakeholder needs, extension agents, research scientists, and department specialists (most of whom have joint Agricultural Experiment Station appointments); collectively conduct sound, relevant research as the basis for extension education; monitor and prioritize pests in Colorado regions through IPM projects and periodic surveys for endemic and invasive species; enhance pest diagnostics through the CSU Plant Pest Clinic and statewide training; and promote collaborative activities with stakeholders and entities at CSU – i.e., departments, STEM, CE & AES; and in Colorado – i.e., CDA and USDA pest programs, Pesticide Applicator Training, Food Safety
- Coordinate and support partnerships with U.S. Forest Service, USDA Agricultural Research Service, and Centers for Disease Control. Funded projects are underway with USFS and USDA ARS. A national training, held by CDC, was attended.
- Enhance communication among all IPM stakeholders, including CSU faculty, state partners, agency personnel, clientele groups, the Western IPM Center, and federal IPM programs. Periodic emails, newsletters and phone calls helped inform advisory committee members and IPM stakeholders of upcoming concerns and funding issues.

- Serve as a conduit for external stakeholder input. An advisory committee was established, consisting of Rella Abernathy (IPM Coordinator, City of Boulder), Beth Conrey (Northern Colorado Beekeepers Association), David W. Cromley (Green Industry), Donna Christensen (Colorado Master Gardeners), Richard Dykstra (Pest Control Industry), Lynn Fagerberg (Vegetable Crops), Larry Lande (Northern Feed & Bean), Tom Larson (Sustainable Agriculture), Laura Pottorff (Colorado Department of Agriculture), Richard Thatcher (Colorado Farm Bureau), and Ed von Bleichert (Environmental Operations, University of Colorado). A state-wide meeting was held 11/20/2011; the agenda included Welcome: Role of the Center Deb Young and Ned Tisserat (Co-Directors); Introductions Round-table: Provide an example of IPM in your work National Scene Tom Holtzer, Head, Bioagricultural Sciences and Pest Management; Updates -- Dennis Lamm (Sustainable Agriculture and WSARE), Steve Newman (Extension IPM Work Team), Howard Schwartz (IPM PIPE), Ned Tisserat (Diagnostics), and Deb Young (School IPM).
- Cooperate with the Rocky Mountain Center for Crop Biosecurity in their goal to develop expanded detection capacity and survey tools with neighboring land grant Universities' Experiment Station and Cooperative Extension networks and federal and state regulatory agencies (USDA/APHIS/PPQ, Colorado Department of Agriculture, and Great Plains Diagnostic Network [GPDN]). The GPDN is one of five regional centers of the National Plant Disease Network (NPDN) established by the USDA. The purpose of the NPDN is to link those involved in crop production (including Land Grant University diagnostic labs) into a cohesive, distributed system to detect pests and pathogens that have been deliberately or unintentionally introduced into agricultural and natural ecosystems.

Description of activities, services, training, or research performed in past 24 months

VEGETABLE AND GRAIN CROPS

Onion - *Iris yellow spot virus* and thrips management (Schwartz). Outcomes of this work were posted on web sites and presented at various meetings for use by the Colorado and national onion industries, growers, seed company breeders and pathologists, and integrated pest management specialists to select more effective management strategies including the promotion of varieties that are less susceptible to damage by thrips and the virus. Growing less susceptible varieties of onions and reducing virus and thrips pressure in Colorado could increase yields by a conservative estimate of 10 percent, valued at 5 million dollars annually. With an estimated cost of 250,000 dollars for salaries and operating costs of project participants from various sources, the Return on Investment is valued at more than 25 to 1.

Colorado vegetable crop disease management (Schwartz). Resistance of new dry bean varieties to priority diseases (such as rust and white mold) can improve yield in Colorado conservatively by 10 percent, valued at more than 4 million dollars annually. Improved pest management strategies and efficacy for diseases of susceptible bean varieties can also increase net returns to growers, valued at an additional 3 million dollars annually. With an estimated cost

of 250,000 dollars for salaries and operating costs of project participants from various sources, the Return on Investment is valued at more than 25 to 1.

Improving management of arthropod pests of vegetable crops (Cranshaw). The identification and promotion of onion cultivars that are resistant or tolerant to thrips feeding provides a long-term and sustainable management approach that is now being adapted within the onion industry. The effectiveness of methyl jasmonate as a seedling treatment to develop increased resistance to crucifer flea beetles introduces a promising new management approach for an insect that has proved particularly difficult to control because of its mobility.

Biology and management of the Russian wheat aphid (Peairs). Russian wheat aphid remains the most significant pest of small grains in Colorado. This work looks at management approaches that are environmentally sound and cost effective -- naturally occurring biological controls, wheat varieties with Dn7 resistance that may be highly effective against the aphid biotype currently dominant in Colorado, and identification of insecticides effective against both Russian wheat aphid and brown wheat mite.

Russian wheat aphid resistance, stress tolerance, and quality enhancement of wheat (Byrne). This research seeks to release wheat cultivars resistant to RWA biotype 2 for the west central Great Plains. They have also improved understanding of the genetic mechanisms of RWA resistance in wheat, further developed high-throughput evaluation of quality-related traits, and identified genomic regions associated with stress tolerance, agronomic traits, and bread making quality.

Wheat stem sawfly in Colorado winter wheat (Peairs). The significance of the presence of wheat stem sawfly in Colorado winter wheat is unknown. Its distribution and spread will be tracked closely for the next several years.

Management of spider mite pests in Colorado field corn (Peairs). This research looks at drought stress, mite abundance, effectiveness of miticides, mite physiology related to infestations, resistance screening, and other management studies.

Pesticide Safety and Education Program (Walker). The goal of this program is to ensure applicators understand how to properly, safely, and effectively use pesticides as well as how to properly store and dispose of pesticide within the State of Colorado. Training addresses adverse risks associated with pesticide misuse and consequences of pesticide drift. Personal safety, protection of the environment, prevention of pesticide drift, endangered species, water quality, and food safety is emphasized.

FOREST AND LANDSCAPE

Thousand cankers disease of black walnut (Tisserat). Survey/collection data documents the widespread occurrence of the walnut twig beetle and the fungus *Geosmithia morbida* in the western United States. The disease is eliminating the majority of black walnut in municipalities, although surviving trees have been identified. These trees, if proven to be resistant to TCD, could serve as important germplasm in breeding programs. In 2011, TCD was detected in Virginia and

Pennsylvania. The impact of this finding is enormous because the disease is considered a serious threat to the survival of black walnut in its native range. The western U.S. surveys have mapped potential sources of the WTB and *G. morbida*, and have inspired states with native populations of black walnut to enact quarantines and to initiate surveillance plans.

Improving management of arthropod pests of nursery crops and landscape plants in Colorado (Cranshaw). Research on thousand cankers disease has been the basis for stimulating a national response to this emergent threat to North American walnut (*Juglans*), which has seen greatly increased involvement in many regions since the July 2010 confirmation of the disease within the native range of black walnut (Knoxville, TN). Many of these are now networked by the thousand cankers listserv, established in 2011. A key research focus is identification of methods to reliably disinfest TCD-affected wood material.

Interactions of emerging threats in forest ecosystems (Jacobi). Dutch Elm Disease (DED) is a vascular wilt disease of *Ulmus* species (elms) incited in North America primarily by the exotic fungus *Ophiostoma novo-ulmi*. The pathogen moves between trees through root grafts and elm bark beetle vectors. A new insect vector, an exotic Asian bark beetle, has been established. This study will be utilized by Urban, State and Federal foresters when making recommendations for elm planting and insect and disease management, and educating the public about the interactions of bark beetles and vascular wilt diseases. Information from this work is especially useful because it addresses management of DED in light of the establishment of a new insect vector.

Integrated weed management strategies in aquatic and non-crop systems (Nissen). Managers of aquatic ecosystems are often dealing with invasive species like Eurasian watermilfoil, invasive aquatic plant that infests lakes and some irrigation canals in Colorado. This invasive species can drastically impact ecosystems as well as recreation. The results of this research provide managers with information necessary to make appropriate decisions about using a new herbicide, Imazamox. Applicators now have very detailed information about its behavior in the plant and the importance of managing water movement during treatment.

Ecology, biology, and management of invasive weeds in Colorado (Beck). This study looks at control of the invasive weed yellow toadflax – what growth stages are most sensitive and best practices for control and decreased injury to desirable shrubs and forbs. Adoption of results also will aid early detection and rapid response efforts for yellow toadflax by dramatically increasing the probability of successful eradication from areas where its populations are low enough to achieve that goal.

COMMUNITY AND URBAN IPM

IPM training and education for the urban audience (Tisserat, Cranshaw). This program provides IPM training/education related to insect pests of residences/structures to underserved/unserved audiences in the Rocky Mountain region. Such a program emphasis has substantial potential to reduce human health risks associated with inappropriate uses of

insecticides in and around homes. It also seeks to provide better information that can allow reduced damage associated with household/structural insect pests. Publications on issues unique to the Rocky Mountain states were developed and updated. As a result, information on insect pests of residences and structures is more readily accessible to public, pest control operators, and facility managers, as indicated by the number of presentation requests, questions answered, and articles in the popular press. Awareness and understanding of bed bugs (as Denver emerged as one of the top ten cities reporting bed bugs) increased. This is indicated by the number of news articles referencing experts at CSU, as well as the number of requests for the bed bug identification poster.

Advanced diagnostic training for Master Gardeners (Tisserat, Blunt). This program develops a structured, advanced diagnostic training course in ornamental pests. Information on insects, diseases and their management is more readily accessible to public and master gardeners, as shown by use in county extension offices and the CSU diagnostic laboratory. Workshop evaluations demonstrate a substantial increase in skills and knowledge (self-reported). Participants were asked to rate the effectiveness in developing participants' skills and knowledge on a scale of one (not at all effective) to 5 (highly effective). Ratings ranged for 3.42 to 4.93. Note that workshops had different presenters and venues. In the small fruit workshop , participants learned to identify small fruit diseases (4.6), identify insects that affect small fruits (4.63), and management techniques (4.4). In the workshop on ornamentals, participants found that the workshop increased skills and knowledge on abiotic problems (3.42), disease (3.92) and insects (3.82). The workshop on vegetables had effectiveness ratings regarding insects (4.5), diseases (4.6) and abiotic problems (4.3). The turf workshop was effective in all topics: diseases (4.6), fact versus myth (4.7) and abiotic (4.7). The workshop on conifers had ratings of 4.94 (diseases), 4.28 (abiotic) and 4.75 (chemical effects). The lawn-check workshop had effectiveness ratings of 4.47 (identification of problems), 4.85 (turf myths), and 4.47 (ornamental and tree problems).

School IPM (Young). Nine school districts, an increase of 50% in the last year, are participating in School IPM and 22 individual schools are serving as pilot schools. Improved IPM practices directly affect 176,000 students in Colorado schools. On-line surveys revealed that there is a need for IPM education (30% said they “never heard of IPM”), training opportunities (50% said the school district does not provide training), and concern (50% ranked pest management as a 4 or 5 on a scale of 1 to 5).

Grants received for IPM projects, December 2012¹. Funding received as of September 2010 was \$1.6 million; funding received as of January 2013 was \$4.5 million.

- Thousand Cankers Disease, Tisserat, N. and Cranshaw, W. 2011-2012, \$100,000, USDA Forest Service.

¹ TITLE OF AWARD, investigators, date, amount, sponsor

- Small grain and turf pathology outreach/research, Tisserat, N. 2012, \$13,541, multiple sources
- 2012 Pesticide Applicator Training, Walker, C., 2011 – 2012, \$34,332, Colorado Department of Agriculture
- A search for improved resistance in common bean through multi-site screening and pathogen characterization, Schwartz, H., \$3,500, University of Nebraska
- Agronomic practices and genetic mechanisms leading to evolution and spread of glyphosate resistance in kochia, Westra, P., 2012 – 2016, \$500,000, USDA
- Aspen mortality in the central Rocky Mountains, Jacobi, W., 2008 – 2013, \$78,000, USFS
- Colorado IPM coordination grant, Young D., 2011 – 2012, \$114,259, USDA
- Develop & implement vegetation restoration effectiveness monitoring program, Brown, C., 2011- 2014, \$15,494, DOI-NPS, National Park Service
- Developing a national plan for the bacterial blight/streak of rice, Leach, J. 2011- 2012, \$19,995, North Carolina State University
- Development of outbreak prediction models for the improvement of Russian wheat aphid pest management strategies, Peairs, F. B.; Merrill, S. C., 2009 – 2012, \$103,218, USDA
- Dry bean - plant spacing project, Schwartz, H., 2010 – 2014, \$12,000, Colorado Dry Bean Administrative Committee
- Entomology - brown wheat mite research, Peairs, F., 2010 – 2015, \$16,685, Colorado Wheat Administrative Committee
- Entomology - research associate in the Department of Bioagricultural Sciences and Pest Management for the development of hard red wheat, Peairs, F., 2010 – 2015, \$25,000, Colorado Wheat Administrative Committee
- Environmental impacts of Russian olive on the south fork of the republican river in eastern Colorado, Norton, A., 2012, \$14,949, Three Rivers Alliance
- European corn borer survey, Hammon, R., 2012, \$9,455, Colorado West Sweet Corn Committee
- Evaluation of Syngenta multiple trait hybrids, Peairs, F., 2011 – 2013, \$29,600, Syngenta
- Grape and stone fruit survey, Bjostad, L., \$16,520, 2012 – 2013, Colorado Department of Agriculture
- Great Plains Diagnostic Network, Tisserat, N., 2007 – 2012, \$88,885, Kansas State University
- Health of cottonwood trees along the High Line Canal, Jacobi, W., 2012, \$14,390, Denver Water Department
- Healthy schools and communities through IPM and expanded partnerships, Young, D., 2011 – 2012, \$6,000, IPM Institute of North America
- Impacts of Mountain Pine Beetle infestations on forested ecosystems along the Colorado Front Range, Jacobi, W., 2010 – 2013, \$47,000, USGS

- IPMPIPE and innovative disease diagnostic tools for onion growers, Schwartz, H. F.; Cranshaw, W. S.; Tisserat, N. A., 2010 – 2014, \$2,467,589, USDA
- Karnal Bunt Survey, Bjostad, L. \$4,437, 2012 – 2013, Colorado Department of Agriculture
- Kochia control in wheat stubble after wheat harvest, Helm, A., 2012, \$11,970, Monsanto
- Limber pine status in Boulder County Colorado, Jacobi, W., 2012, \$9,961, Boulder County Parks and Open Space
- On-farm validation of cultural practice adjustments to improve white mold management in dry bean irrigation systems, Kemp, W. P.; Schwartz, H. 2011 – 2012, \$41,066, USDA
- Onion disease management, Cranshaw, W., 2010 – 2012, \$3,500, Colorado Onion Association
- Onion disease management, Schwartz, H., 2010 – 2015, \$7,500, Colorado Onion Association
- Re-introduction of *Rhinusa linariae* for yellow toadflax control, Norton, A., 2012 – 2013, \$19,963, Colorado Department of Agriculture
- Small grains and corn bundled survey, Bjostad, L., 2012 – 2013, \$16,973, Colorado Department of Agriculture
- Small grains commodity survey, Bjostad, L., 2012 – 2013, \$18,233, Colorado Department of Agriculture
- The Rocky Mountain Consortium – expanding verifiable integrated pest management in public schools, Young, D.; Davis, R. 2012– 2014, \$248,000, EPA
- The role of root system architecture in drought tolerance, McKay, J., 2012 – 2017, \$19,250, USDA
- Understanding corn rootworm-host interactions toward basic and applied goals, Bjostad, L., 2009 – 2013, \$438,000, USDA

Publications

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- Cranshaw, W. S., Camper, M, and Peairs, F. B. 2011. Bat Bugs, Bed Bugs and Relatives. CSU Extension Fact Sheet No. 5.574.
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Effects on teaching and outreach

Thirty on-campus courses are taught related to IPM:

- Advanced Evolution & Classification of Insects (BSPM 523, Kondratieff)
- Advanced Integrated Pest Management (BSPM 551, Peairs and other IPM faculty)
- Advanced Systematics (BSPM/BZ 520, Kondratieff)
- Agriculture Entomology Lab (BSPM 303C, Kondratieff)
- Applied and General Entomology (BSPM 302, Ode)
- Aquatic Insects (BSPM 445, Kondratieff)
- Attributes in Living Systems (LIFE 102, Bjostad & Kondratieff)
- Biological Control (BSPM 556, Ode)
- Chemical Ecology (BSPM 570, Bjostad)
- Ecology and management of weeds (BSPM 308, Beck)
- Elements of Plant Pathology (BSPM 361, Tisserat)

- Evolution and Classification of Insects (BSPM/BZ 424, Kondratieff)
- Forest Health Issues (BSPM 521, Jacobi)
- General Entomology Lab (BSPM 303A, Kondratieff)
- Herbicide Selectivity and Action (BSPM 509, Nissen)
- Horticultural Entomology Lab (BSPM303B, Cranshaw)
- Immature Insects (BSPM 555, Kondratieff)
- Insect Behavior (BSPM 507, Bjostad)
- Insect Plant Disease Relationship (BSPM 510, Cranshaw)
- Insects, Science and Society (BSPM102, Camper & Cranshaw)
- Integrated Pest Management (BSPM 451, Peairs and other IPM faculty)
- Integrated Tree Health Management (BSPM 365, Jacobi)
- Invasive Plants and Weeds (BSPM 528, Brown)
- Livestock Entomology (BSPM/ANEQ 300B, Kondratieff & Peairs)
- Plant Pathogenic Fungi (BSPM 580A2, Tisserat)
- Plants and Civilization (AGRI/IE 116, Camper & Norton)
- Principles Systematic Zoology (BSPM 423, Kondratieff)
- Scientific Writing (BSPM 530, Jacobi & Ode)
- Techniques in Chemical Ecology (BSPM 571, Bjostad)
- Understanding Pesticides (BSPM 310, Peairs)

Faculty reached the public through numerous presentations. In 2012, faculty made presentations to more than 7,000 individuals. Audiences included farmers, pest control applicators, public housing managers, housing and facility managers on campus, custodial and facility managers, teachers and principals in public schools, nurses, environmental health specialists, weatherization specialists, and the general public.

Plans for next 24 months

1) We will continue to address issues important to the state – IPM for a sustainable society. As stated by the western IPM coordinators, “IPM protects food security, public health, and sustainable communities through an adaptive and responsive process.” Attention is paid to the detection and diagnostics of new pests (collaborating with the Great Plains Diagnostic Network and CSU’s Rocky Mountain Center for Biosecurity) as well as to pesticide safety and education. Desired long-term outcomes for the program are to improve economic benefits related to the adoption of IPM practices; to reduce potential human health risks from pests and the use of IPM practices; and to minimize adverse environmental risks from pests and the use of IPM practices.

Issues are identified locally; appropriate practices are developed and validated. These practices are applied and shared regionally and nationally. We will seek input from stakeholders, advisory committees and interested parties.

a) Irrigated and dryland crops (vegetables and grain) – the 2011 value of production (Colorado Agricultural Statistics) was \$2,893,012,000. The development of plant protection tactics and tools continues to be important economically. Another issue of importance is enhancing agricultural biosecurity.

b) Forests and range – more than 1/3 of Colorado’s land area is owned by the public and managed by several federal and state agencies and local governments. Tools to support IPM practices on these lands, natural systems and recreational areas – from mountain pine beetle to invasive weeds – affect residents and visitors alike.

c) Communities – in 2000, the population of Colorado was classified as 84.5% urban. Population trends show that residents are increasingly choosing city living over the more rural regions of the state (Andy Goetz, University of Denver, 2011). In order to serve these populations, nontraditional IPM programs will minimize threats to public, economic, and environmental health, living / working spaces, and quality of life within the community.

2) The Center supports maintaining funding for competitive state-level coordination of IPM extension and outreach programs. IPM funding to States, under the National Institute of Food and Agriculture, is unsure. To date, no decisions have been made regarding consolidation of budget lines under “crop protection” in the USDA Farm Bill. The Western IPM Center has a new director; joint western projects will continue to be important.

3) Within the College of Agricultural Sciences, the Department of Bioagricultural Sciences and Pest Management is seeking several positions, as faculty retire and resign for other assignments. With new faculty on board, we will look to new collaborations within the college, university, and neighboring universities.

4) We will seek new partnerships in traditional and nontraditional areas.