Vegetable (Specialty) Crops IPM Logic Model

Situation	Inputs	Outputs		Outcomes- Impacts		
		Activities	Participation	Short Term Knowledge	Medium Term Behavior	Long Term Long term
1) A need for effective IPM in high value, high input vegetable cropping systems with many insect, weed, and disease pests **2)** A need for science and research based information on pest biology, management, and IPM solutions specific to a unique low desert cropping system **3)** A need for education and outreach (integrating e-technologies) to facilitate PCA and farmer adoption of reduced-risk pesticides, resistance mgt. practices & IPM strategies **4)** A need to demonstrate new technologies to support commercial adoption	**1)** Our time and expertise: Assistant in Extension Peña; Vegetable IPM Leadership Team (Entomologist, Plant Pathologist, Weed Scientist, IPM Assessment Specialist, Veget-able production & food safety Specialist) **2)** AiE for pesticide education **3)** IPM Assess-ment Leadership Team, pesticide use database and crop pest losses surveys to support evaluation **3)** Travel expenses **4)** Cost of organiz-ing workshops and field days **5**) Equipment and software for devel-oping videos **6**) Resources for conducting lab, greenhouse, and field demonstrations at Yuma Ag. Ctr. & commercial fields **7)** Stakeholder input on IPM priorities and emerging issues to support IPM program planning and focus of resources	**1)** Stakeholder engagement to identify priorities, support on-farm research demonstrations and IPM assessment activities **2)** Production of new IPM technical publications and videos, including bi-weekly "Veg IPM Updates" delivered via email, smart phone and online, in response to timely pest issues and grower and PCA questions (e.g., bagrada bug) **3)** Translational science and on-farm demonstrations (new tech-nology/efficacy for insects, weeds & diseases) **4)** Educational meetings and events (Extension meetings, industry/PCA educational meetings, field days) **5)** IPM education for pesticide applicators with support of AiE for pesticide education **6)** Pest Crop Loss Workshops and other IPM assessments to document outcomes, impact **7)** Field site visits in response to pest issues, guidance on new and existing problems (e.g., insect, dis-ease & weeds, pesticide resistance) to support IPM implementation **8)** Participate in regional and national dialog regarding IPM and resistance management in specialty crops	**1)** AZ and CA Vegetable, melon & other specialty crop growers **2)** AZ and CA Pest Control Advisors (PCAs) **3)** Pesticide applicators **4)** Ag industry representatives **4)** AZ and CA stakeholders organizations with leadership in the area **5)** Academic and Extension scientists (through collaborations and research presented at scientific meetings)	**1)** Increased awareness and knowledge of IPM, including new technology in vegetable, melon & other specialty crop production **2)** Improved under-standing of how new reduced-risk chemistries replace old broadly-toxic pesticides **3)** Improved under-standing of resistance management **4)** Improved under-standing of advanced concepts in "risk" and risk management. **<u>Possible Measures</u>:** **1)** Measure participation via the number of subscribers of the Vegetable IPM Updates; page hits and number of views of articles and videos online in Veg IPM archives and You -tube **2)** Use of audience response system to measure changes in grower, PCA and applicator knowledge of IPM, resistance management, risk and pesticide risk mitigation	**1)** Increased use and adoption of reduced-risk IPM management options in vegetable production. **2)** Reduced usage of broad-spectrum, high-risk pesticides **3)** Identification and avoidance by PCAs, growers and applicators of practices that increase the risk of resistance generation and other risks. **<u>Possible Measures</u>:** **1)** Document changes in pest management practices with surveys and audience response systems deployed at meetings and field days **2)** Document changes in pesticide use and adoption of reduced risk practices with crop pest losses surveys (lettuce and melons) and APMC Pesticide Use Database	**1)** Reduced pesticide residues and environmental risks **2)** Reduced risk to health and safety of pesticide applicators and the public **3)** Improved yield and economic returns for growers **<u>Possible Measures</u>:** **1**) Established lettuce and melon pest losses survey to follow long-term adoption and change in IPM practices **2)** Measure change in pesticide use and registrations using the APMC pesticide use database **3)** Quantify pesticide risk reduction and risk mitigation practices in lettuces in collaboration with Oregon State University using Pesticide Risk Mitigation Engine (ipmPRiME)

How our Logic Model supports Outcomes and Impacts of the CPPM Logic Model:

- We increase knowledge and implementation of new IPM tools and tactics in integrated strategies for IPM; for example, selective management of whiteflies, aphids and thrips across crops (e.g., leafy vegetables, melons) to increase economic and environmental benefits of IPM
- We adapt existing science-based IPM knowledge to new pest scenarios and foster sound IPM solutions. An example is our work to test and expand existing selective management strategies for control of the invasive bagrada bug in cole crops, which will reduce broad-spectrum insecticide use in this crop, which has expanded since its invasion in 2010.
- We will facilitate production of audience-appropriate IPM training materials for vegetable crops including traditional, web-based, and mobile-friendly technologies, e.g., our bi-weekly Veg IPM Updates (http://ag.arizona.edu/crops/vegetables/advisories/advisories.html)
- We participate in communication among the scientific community and among research, teaching and extension communities locally and regionally, through the Western IPM Center, Western IR-4 interactions and WERA-1017 (IPM) and WERA-060 (resistance management), scientific collaborations with colleagues, presentations and discussions at regional and national scientific conferences to share information and expand potential impacts of our work.
- As a result of much of our work, innovative and diversified IPM systems are adopted on an area-wide or landscape scale; examples include our cross-commodity IPM programs (e.g., Palumbo et al. 2003) and management of whitefly to protect against cucurbit yellow staining disorder virus (CYSDV), a disease that can devastate production of fall melons; these practices help sustain economic and environmental benefits of IPM to growers
- More sustainable IPM practices are adopted by producers and their pest managers across vegetables, melons, cole crops and other specialty crops
- Cost-benefit ratios of adopting IPM are improved
- Human health, economic and environmental risks are reduced
- Through resources developed by the APMC IPM Assessment Leadership Team, including pesticide use data, Western IPM Center Crop Pest Losses Signature Program, and ipmPRiME collaborations with Oregon State University, we measure adoption and impact of IPM, including changes in knowledge, individual and group behaviors (e.g., pesticide use) and their impact on the environment and human health (eco-toxicological risk)