# Logic model: Management of BMSB in US Specialty Crops

#### Situation Inputs Activities Outputs **Outcomes** Brown marmorated • Personnel: Project director (1); co-Objective 1: Landscape ecology Outputs: Near and mid-term: stink bug (BMSB) has Project directors (6); Objective leader Monitor BMSB in specialty crops across US. Increased knowledge Expansive range of Assess suitability of landscapes for BMSB based on host spread throughout co-PIs (5); co-Investigators (35); BMSB will be allows growers to most of the US. Institutions (17 universities, USDAdelimited. determine BMSB risk ARS); post docs (TBD), Students (TBD) Integrate landscape-level habitat maps and data on abiotic • It damages specialty and choose factors to predict BMSB distribution and damage risk across · Biological control • Expertise: Entomology, Ecology, and agronomic crops appropriate regions. will be integrated and is a nuisance pest Biological control, Economics, Social mitigation measures. into IPM programs. Science including Survey and Impact Objective 2: Biological control Monitoring and in residences.

- Facilities: Core facilities, cooperating farms and residences, research stations
- Resources: Project funds, stakeholder relationships, StopBMSB.org

Assessment

· Long-term

management

are needed.

solutions that are

biologically based and

economically sound

- · Process, skills, and tools:
- Builds upon existing knowledge, outreach and identified needs.
- · Diverse stakeholder input.
- Multi-state, multi-institutional and transdisciplinary activities unite team expertise across all objectives.
- On-farm research trials for validation of results.
- Information delivery and extension outreach.

- Determine distribution and impact of Asian biological control parasitoids on BMSB and native stink bugs species. Assess diversity, adaption and impact of native parasitoids on BMSB.
- Assess diversity and impact of native parasitoids on BMSB population regulation.
- Assess diversity and impact of native predator on BMSB population regulation.
- Identify entomopathogens of BMSB.

## Objective 3: Sustainable IPM

- Develop decision-support tools for informed pest management decisions.
- Identify insecticides and use-strategies compatible with biological control and IPM programs.
- Develop behavioral and semiochemical-based strategies.
- Develop habitat manipulation strategies
- · Integrate tactics within and across crop agroecosystems.

# Objective 4: Economics

- Assess economic potential of classical biological control of BMSB on specialty crops.
- Develop estimates of cost/benefits of specific management practices.
- Develop surveys as program evaluation tools.

#### Objective 5: Outreach and impact assessments

- Inspire next generation of invasive pest experts.
  Expand and maintain a knowledge repository of RMS
- Expand and maintain a knowledge repository of BMSB lessons, insights and success stories utilizing StopBMSM.org.
- Expand relevancy of BMSB outreach resources to all U.S. Regions.
- Evaluate social benefits of improved conditions resulting from the project.

- Stakeholders will have new tools to make management decisions.
- The nuisance issues for residences will diminish.
- Biological control will become established and effective against BMSB.
- IPM for other pests will evolve from BMSB management strategies.

Increased knowledge allows growers to determine BMSB risk and choose appropriate mitigation measures. Monitoring and decision-based models will reduce damage across the US. The nuisance problem that BMSB poses to residences and businesses will diminish.

### Long term:

Biological control will eventually change BMSB from a serious pest into an occasional pest. Cropspecific IPM programs will allow growers to produce crops in an economically viable and ecologically sound manner.

**ASSUMPTIONS** - The brown marmorated stink bug will become a manageable pest as we conduct research to understand its spread and how best to manage it as stakeholders incorporate new knowledge and tactics into their IPM programs.

**EXTERNAL FACTORS:** The demand for US specialty crops will remain high and constraints on biological control may keep BMSB as a serious pest.