Minnesota Invasive Terrestrial Plants and Pests Center
ML 2015, Ch. 76, Art. 2, Subd. 6a
Funded Research Projects

Lead PI	Research Project	Amount Funded	
Anderson	MITPPC # 7 Tools to distinguish native from exotic reed canary grass	$268,000	*Phalaris arundinacea*, reed canary grass, priority plant #12
Aukema	MITPPC #9 Characterizing dispersal of larval gypsy moth to improve quarantine regulations	$35,000	*Lymantria dispar,* European gypsy moth, priority insect #5
Aukema	MITPPC #5 Optimizing tree injections against emerald ash	$320,000	*Agrilus planipennis,* emerald ash borer, priority insect #2
Cavender-Bares	MITPCC #8: Accurate Detection and Integrated Treatment of Oak Wilt (*Ceratocystis fagacearum)* in Minnesota	$357,420	*Ceratocystis fagacearum*, oak wilt, priority pathogen #2
Heimpel	MITPPC #3: Biological control of the soybean aphid by *Aphelinus certus*	$600,000	*Aphis glycines,* soybean aphid, priority insect #3
Koch	MITPPC #4: Decreasing environmental impacts of soybean aphid management)	$570,000	*Aphis glycines,* soybean aphid, priority insect #3
Malvick	MITPPC #6: Distribution and Traits of the Fungal Pathogen *Fusarium virguliforme* that Influence Current and Future Risk to Soybean and Other Legumes in Minnesota	$412,000	*Fusarium virguliforme,* soybean sudden death, priority pathogen #13
Reich	MITPPC #11: Will Future Weather Favor Minnesota's Woody Invaders?	$526,000	*Lonicera morrowii,* Morrow's honeysuckle, priority plant #3; *Frangula alnus,* glossy buckthorn, priority plant #4*; Lonicera tatarica,* Tatarian honeysuckle, priority plant #6*, Rhamnus cathartica,* European buckthorn, priority plant #7
Rogers	MITPPC # 10: Management Strategies for the Invasive Spotted Wing Drosophila	$505,000	*Drosophila suzukii,* Spotted Wing Drosophila, priority insect #13
Sub-Total		**$3,593,420**	
Becker	MITPPC #1 Garlic mustard biocontrol: Ecological host range of biocontrol agents	$600,000	*Alliaria petiolata,* garlic mustard, priority plant #15

Chase	MITPPC # 2: Mountain Pine Beetle, Phase II: Protecting Minnesota	$456,000	*Dendroctonus ponderosae,* mountain pine beetle, priority insect #1
TOTAL		**$4,649,420**	

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Official title: MITPPC # 7 Tools to distinguish native from exotic reed canary grass

MITPPC priority species: *Phalaris arundinacea,* reed canarygrass (MITPPC Priority Plant #12)

MITPPC priority theme: Detection and Distribution

MITPPC funding: $268,000

Lead investigator: Neil Anderson, UMN-Twin Cities (Horticultural Sciences)

Cooperators: Minnesota Department of Transportation; Minnesota Department of Natural Resources

Brief synopsis of goals and activities: This project will identify structural plant traits to distinguish native from exotic forms, but these traits might only be reliably used by skilled botanists for identification. Hand-held molecular testing tools will be developed for native / exotic types to enable land managers to quickly determine the status of populations. A small scale survey will confirm the utility of the test. This research sets the stage for a broader survey (not funded under this proposal) and is a critical tool to ensure management only affects non-native genotypes.

Official title: MITPPC #9 Characterizing dispersal of larval gypsy moth to improve quarantine regulations

MITPPC priority species: *Lymantria dispar,* European gypsy moth (MITPPC Priority Insect #5)

MITPPC priority theme: Management alternative effectiveness

MITPPC funding: $35,000

Lead investigator: Dr. Brian Aukema, UMN-Twin Cities (Entomology)

Cooperators: USDA-APHIS; Minnesota Department of Agriculture; Wisconsin Department of Agriculture, Trade, and Consumer Protection.

Brief synopsis of goals and activities: This proposal will conduct laboratory and field-based behavioral and mark-resight studies to determine how feeding status and age affect dispersal and what are the costs and effectiveness of different barriers around woodpiles.

Official title: MITPPC #5 Optimizing tree injections against emerald ash

MITPPC priority species: *Agrilus planipennis,* Emerald ash borer (MITPPC Priority Insect #2)

MITPPC priority theme: Management alternative effectiveness

MITPPC funding: $320,000

Lead investigator: Dr. Brian Aukema, UMN-Twin Cities (Entomology)

Cooperators: Minnesota Department of Agriculture

Brief synopsis of goals and activities: This research will quantify the proportion of trees that must be treated to confer herd immunity to untreated trees for two different non-neonicitinoid compounds. It will also evaluate potential impacts to non-target insects by surveying insects in treated and untreated ash and conducting laboratory tests to quantify non-target effects for insects associated with ash.

Official title: MITPCC #8: Accurate Detection and Integrated Treatment of Oak Wilt (*Ceratocystis fagacearum)* in Minnesota

MITPPC priority species: *Ceratocystis fagacearum*, fungus that causes oak wilt (MITPPC Priority Pathogen #2)

MITPPC priority theme: Detection and distribution; management alternative effectiveness

MITPPC funding: $357,420

Lead investigator: Jeannine Cavender-Bares, UMN-Twin Cities (Ecology, Evolution and Behavior)

Cooperators: Forest Resources; US Forest Service; Cedar Creek Ecosystem Science; University of Nebraska, Lincoln; University of Wisconsin, Madison

Brief synopsis of goals and activities: The project will develop 1) tools for accurate detection and monitoring of oak wilt in Minnesota at multiple spatial scales using hyperspectral imagery and 2) new tools and guidelines to prevent the spread of the disease.

Official title: MITPPC #3: Biological control of the soybean aphid by *Aphelinus certus*

MITPPC priority species: *Aphis glycines*, soybean aphid (MITPPC Priority Insect #3)

MITPPC priority theme: Management alternative effectiveness

MITPPC funding: $600,000

Lead investigator: George Heimpel, UMN-Twin Cities (Entomology)

Cooperators: Minnesota Department of Agriculture; Minnesota Zoo

Brief synopsis of goals and activities: The overarching goal of this proposal is to understand the extent to which the Asian parasitoid, *Aphelinus certus*, is suppressing soybean aphid populations throughout Minnesota and the extent to which this reduces the insecticide use.

Official title: MITPPC #4: Decreasing environmental impacts of soybean aphid management

MITPPC priority species: *Aphis glycines*, soybean aphid (MITPPC Priority Insect #3)

MITPPC priority theme: Management alternative effectiveness

MITPPC funding: $570,000

Lead investigator: Robert Koch, UMN-Twin Cities (Entomology)

Cooperators: Soybean Breeding and Genetics Program; Aerospace Engineering & Mechanics

Brief synopsis of goals and activities: Current management of the soybean aphid, *Aphis glycines*, relies on application of broad-spectrum insecticides. The goal is to decrease insecticide use and ameliorate associated environmental impacts through development of aphid-resistant soybean varieties and avoid unnecessary insecticide use through remote scouting.

Other notes: This project will leverage $30,000 in the first year from the Minnesota Soybean Research and Promotion Council.

Official title: MITPPC #6: Distribution and Traits of the Fungal Pathogen *Fusarium virguliforme* that Influence Current and Future Risk to Soybean and Other Legumes in Minnesota

MITPPC priority species: *Fusarium virguliforme*, soybean sudden death (MITPPC Priority Pathogen #13)

MITPPC priority theme: Detection and distribution; response of TIS to climate change

MITPPC funding: $412,000

Lead investigator: Dean Malvick, UMN-Twin Cities (Plant Pathology)

Cooperators: Plant Biology; Fisheries, Wildlife, and Conservation Biology

Brief synopsis of goals and activities: *Fusarium virguliforme* is a relatively new invasive pathogen in Minnesota that causes sudden death syndrome on soybean and root rot on other legumes. The severe impacts of this pathogen are likely to stimulate greater use of fungicides, unless alternatives can be found. The overall goal is to fill in key gaps in knowledge of abiotic and biotic factors controlling the pathogen's distribution and the diseases it causes, and to develop tools to accelerate breeding for resistant varieties.

Official title: MITPPC #11: Will Future Weather Favor Minnesota's Woody Invaders?

MITPPC priority species: *Lonicera morrowii*, Morrow's honeysuckle (MITPPC Priority Plant #3); *Frangula alnus* glossy buckthorn (#4); *Lonicera tatarica*, Tatarian honeysuckle (#6); *Rhamus cathartica*, European buckthorn (#7)

MITPPC priority theme: Response of TIS to future conditions

MITPPC funding: $526,000

Lead investigator: Peter Reich, UMN-Twin Cities (Forest Resources)

Cooperators: Computer science; The Nature Conservancy; US Forest Service; Minnesota Department of Natural Resources, Johns Hopkins University

Brief synopsis of goals and activities: This research will quantify and map how four important woody invaders will compete with key native tree species in forest settings under current and future climate conditions. These climate sensitivity assessments for the four woody invaders will be useful in threat assessment and planning for the spread of the woody invaders in a warmer and/or warmer and drier climate.

Official title: MITPPC #10 Management strategies for the invasive spotted wing drosophila

MITPPC priority species: *Drosophila suzukii,* spotted wing drosophila (MITPPC Priority Insect #13)

MITPPC priority theme: Detection and distribution; management alternative effectiveness; socio-economic impacts

MITPPC funding: $505,000

Lead investigator: Mary Rogers, UMN-TC (Horticulture)

Cooperators: Entomology; Applied Economics; Aerospace Engineering & Mechanics; Metropolitan State University

Brief synopsis of goals and activities: This research project will improve SWD forecasting by understand the relative impacts of local movement, long-distance migration, and potential overwintering sources. It will investigate the efficacy of innovative and alternative management techniques and it will evaluate the cost effectiveness and aggregate economic impact of SWD management alternatives and develop decision-making tools for Minnesota berry growers.

Official title: MITPPC #1 Garlic mustard biocontrol: Ecological host range of biocontrol agents

MITPPC priority species: *Alliaria petiolata*, garlic mustard (MITPPC Priority Plant #15)

MITPPC priority theme: Effectiveness of management alternatives

MITPPC funding: $600,000

Lead investigator: Roger Becker, UMN-Twin Cities (Agronomy & Plant Sciences)

Cooperators: CABI, USDA-APHIS, USDA TAG, Minnesota Department of Natural Resources

Brief synopsis of goals and activities: The long-term goal of this project is to implement a novel technique to achieve long-term sustainable management of *A. petiolata* by developing a biological control program. Host range tests have characterized the fundamental host range of *C. scrobicollis* and similar research will be done for *C. constrictus*. The specific goal of this proposal is to help define the ecological host range of these *Ceutorhynchus* species. The specific outcomes of this project are to characterize the impact, host range, and potential distribution of *C. scrobicollis* and *C. constrictus*. The knowledge gained from this study will help determine whether these potential biocontrol agents have the host specificity to be safe and effective biocontrol agents and will lay the foundation for biological

control implementation.

Official title: MITPPC # 2: Mountain Pine Beetle, Phase II: Protecting Minnesota

MITPPC priority species: *Denroctonus ponderosae*, mountain pine beetle (MITPPC Priority Insect #1)

MITPPC priority theme: Detection and Distribution; Effectiveness of management alternatives

MITPPC funding: $456,000

Lead investigator: Kevin Chase, UMN-Twin Cities (Entomology)

Cooperators: Minnesota Department of Agriculture; Wheaton College Biological Field Station; US Forest Service; University of Alberta

Brief synopsis of goals and activities: This research will focus on characterizing immigration risk of the mountain pine beetle to Minnesota from proximate pine refugia and determine the susceptibility of living pines in Minnesota to adult beetles and their fungal associates. This scope of work differs from the original submission with the removal of the wood chipping activity, as external reviewers viewed it as inconsequential to the research program.