

Western Regional IPM Grants Annual Progress Report Guidelines

Due October 15, 2008

INSTRUCTIONS: PLEASE PROVIDE ONLY THE ESSENTIAL COMPONENTS OF ACCOMPLISHMENT WHICH ARE:

1. A CLEAR IDENTIFICATION OF THE PROBLEM/ISSUE ADDRESSED BY THE RESEARCH/EXTENSION.
2. A CONCISE EXPLANATION OF HOW THE RESEARCH/EXTENSION ACHIEVEMENT CONTRIBUTED TO THE SOLUTION OF THE PROBLEM/ISSUE BEING RESEARCHED.
3. THE IDENTIFICATION OF OTHER BENEFITS RESULTING FROM THE RESEARCH/EXTENSION, EVEN IF UNPLANNED.
4. **PLEASE ATTACH A SUMMARY OF THE PAST YEARS PROGRESS, ONE PAGE MINIMUM.**

PROJECT NUMBER: 2006-34103-16956

PROJECT TITLE: Assessment and Implementation of Native Insecticidal Nematodes: An Alternative for Control of Urban Pests

LEAD PRINCIPAL INVESTIGATOR: S. Patricia Stock

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THE PROBLEM, ISSUE, OR REASON FOR PURSUING THIS RESEARCH/
EXTENSION PROJECT.

The National IPM Road Map Program for residential and public areas states that “the greatest human population exposure to pests and the tactics used to control them occur where people live, work, and play”. Therefore, the expansion of integrated pest management programs in urban and suburban area will help minimize human health risks posed by pests, and also will contribute to reducing or mitigating the adverse environmental effects of pest management practices. To address these needs we propose to develop an alternative tool for use in urban integrated pest management systems by considering commercially-available and Arizona-native entomopathogenic nematodes (EPN) for control of arthropod pests in western USA.

THE SINGLE MOST IMPORTANT ACCOMPLISHMENT OR BENEFIT RESULTING FROM THIS RESEARCH/EXTENSION PROJECT.

The research and extension activities proposed in this project address several future IPM needs outlined by the national IPM program such as the adoption of new pest management strategies including development of new generation low-risk suppression tactics including biological control agents, and the creation of public awareness and understanding of IPM programs throughout education programs in schools, colleges, and creative mass media.

BRIEFLY DESCRIBE ADDITIONAL BENEFITS, SUCH AS:

If proven successful, EPN may provide an alternative option for urban pest management and may help reduce potential risks to human health a caused by pests themselves or by the use of chemical pesticides. Stakeholders and representatives of many pest control companies and school districts from the state of Arizona have identified the need of environmentally-safe alternatives for the control of urban and suburban pests. Therefore this research will directly benefit these stakeholders' needs.

ECONOMIC BENEFITS

Not yet estimated

ENVIRONMENTAL BENEFITS

EPN offer numerous advantages in terms of safety to humans and non-target organisms, reduction of pesticides residues, preservation of other natural enemies, and increased biodiversity in managed ecosystems safe to non-target organisms including humans, other vertebrates, and plants, and do not pollute the environment. Results from this research will assist in developing EPN as an environmentally friendly alternative (reduced-risk alternative) to urban IPM practices.

OTHER

EPN can be mass-produced in large fermentation tanks, can be stored for long periods and applied by conventional methods using standard spray equipment, making them a desirable alternative for commercial formulation.

PLEASE SUBMIT A HIGH RESOLUTION DIGITAL IMAGE REPRESENTATIVE OF YOUR RESEARCH/EXTENSION PROJECT THAT WE CAN USE IN WESTERN IPM CENTER PUBLICATIONS WHICH MENTION YOUR PROJECT.

THIS FORM WAS COMPLETED BY:



S. Patricia Stock, Associate Professor

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U.S. Department of Agriculture Accomplishments Report AD-421 (investigator copy) U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions			Date (Month, Day, Year) 07/16/2008
1. Accession 0206983	Agency Identification No. 2. CSREES 3. ARZT	5. Work Unit/Project No. ARZT-355630-G-31-530	6. Status Annual Report
7. Title Assessment and Implementation of Native Insecticidal Nematodes: An Alternative for Control of Urban Pests			
12. Investigator Name(s) (Last Name and Initials) Stock, S. P.; Gouge, D. H.			
20. Termination Date 06/30/2009		40. Period Covered (mo/da/year): 07/01/2007 TO 06/30/2008	
Outputs: The overall goal of this project is to assess commercially available and Arizona-native entomopathogenic nematodes (hereafter referred to as EPN) as an alternative tool for integrated pest management for control of urban arthropod pests in western US, and to consider the use of EPN alone and/or in combination with chemical pesticides to help minimize current chemical pesticide practices, therefore reducing the risk of health problems and protection and conservation of ecosystem quality and diversity. During this period we have accomplished assays outlined for objectives 1 (to determine an optimum dosage and best nematode species/strain for the management of selected urban pests in the southwest) and 3 (to study the effect of abiotic (e.g. temperature, soil moisture, UV tolerance) and biotic parameters (foraging behavior) to maximize nematode efficacy).			
Outcomes/Impacts: Objective 1: To effectively implement EPN for the management of desert urban pests in western US, some basic data on host range and dosage needs to be first established. Until now, this information was very limited, but it is fundamental for the evaluation of the efficacy of these native EPN species/strains, and critical for subsequent experimental or management activities. Three native and two commercially available EPN species were tested for their host susceptibility against a selection of arthropod pests (termites, scorpions and cockroaches) currently considered major urban pests in Arizona. Selected insects were exposed to four nematode densities: 50, 500, 1,000 and 2,000 IJ/host. Host mortality and nematode reproduction in the host were observed for each nematode density. Objective 3: Efficacy of EPN is usually reduced due to their sensitivity to environmental extremes such as high temperatures, low humidity and solar-UV radiation. Knowledge about the sensitivity of nematode strains to each of these factors is necessary both prior to introduction to the natural environment and to develop a selection regime for consideration in future genetic improvement programs. During this period we assessed: a) temperature effect on infectivity and reproduction, b) effect of soil moisture on infectivity, c) effect of UV exposure on infectivity and d) nematode foraging behavior.			
Publications: No Publications Reported			
Participants: Kate Faulkner (graduate student), Yolanda Flores Lara (postdoctoral associate and Chan Maketon, undergraduate student, Department of Entomology, University of Arizona.			
Target Audiences: Outreach activities: Stock, S. P. 2007. Nematodes and Agriculture in the Southwest: The Good, the Bad and the Ugly. Yuma Ag. Summit, Yuma AZ. Stock, S. P. 2007. Entomopathogenic nematodes from xerophytic habitats: diversity, distributional patterns and ecological notes. XL Annual Meeting of the Society for Invertebrate Pathology, Quebec, Canada, August 12-16. Stock, S. P. 2008. Close Encounters of a Mutualistic Kind: The Steinernema-Xenorhabdus Symbiosis. Dept. Entomology, Fall Seminar Series, Univ. Arizona, Tucson, AZ.			



Right: healthy Scorpion, prior to EPN infection, left: close-up of infected scorpion with EPN *S. riobrave*, emerging through cuticle.