

12-1-2013

## Community Involvement to Reduce Insect Threats to Urban Forests

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### Recommended Citation

O'Callaghan, A. M., & Skelly, J. (2013). Community Involvement to Reduce Insect Threats to Urban Forests. *The Journal of Extension*, 51(6), Article 33. <https://tigerprints.clemson.edu/joe/vol51/iss6/33>

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## Community Involvement to Reduce Insect Threats to Urban Forests

### Abstract

While urban trees increase property values and improve human health, healthy urban trees also reduce potential infestation of nearby native forests. We developed a collaborative program to raise public consciousness of risks to trees from invasive insects before injury has occurred. The Nevada Department of Agriculture entomologist trained Extension Master Gardeners to recognize the threats, signs, and symptoms of alien arthropod species. They then taught classes in venues around the state, bringing awareness of potential problems. By 2013, over 700 professionals and local residents had attended a class, increasing the number of educated and concerned observers around Nevada.

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### Introduction

Urban forests are rarely included in the calculation of native forest health, but the many trees in urban areas, particularly in an arid state like Nevada, can affect native tree health. Trees in cities are beautiful, increase property values, and act as "air purifiers" in densely populated areas (Donovan et al., 2013; McPherson, Simpson, Peper, Maco, & Xiao, 2005). Attack by invasive arthropod species, especially borers, could threaten the health of city trees. Unchecked infestations can also harm plants and animals in surrounding wildlands.

Monitoring by trained, interested people who will report threats to appropriate agencies is necessary to prevent infestations and to reduce damage. More eyes watching for indications of infestation reduces the likelihood of destruction to urban and native forests.

There is a distinct range of environments in Nevada. Rangelands cover much of the state, yet Nevada also has more mountain ranges than other states (Moen, 2013). Although there are large areas of wildlands, Nevada is actually highly urbanized. In the northwestern area (Reno, Sparks, Carson City), Lake Tahoe is environmentally sensitive and essential to the local economy. The Mojave, smallest and driest of North American deserts, dominates the ecology of southern Nevada. This is the site of Las Vegas as well as Lake Mead, the primary water source for the American

Southwest.

Invasive arthropod species threaten wild and urban lands (Sundermeier, 2005; Mangold, Samman, & Harrington, 2003). Nevada forests already face risks from climate extremes and human activities. Insect pests that kill trees could spread easily from city to rural areas, and vice versa. Not only would infestations destroy trees and eliminate their many benefits, they would also increase fire threats (Mangold et al., 2003), an ever-present concern throughout Nevada. Major fires in the northern area of the state have destroyed large forested areas, as well as homes and businesses. There are fewer fires in southern Nevada, which is generally a desert environment (outside of mountainous areas). Throughout the state, it takes a long time for native trees to re-establish after fire. This opens the door to invasions by other non-native species, which then pose additional environmental threats.

## **Program Goal**

The Nevada Division of Forestry (NDF) received a grant from the USDA Forest Service (USFS) to develop a program in which trained citizens would monitor forest health, both urban and native, and spread the word about the need for vigilance. In 2010, NDF contracted with the University of Nevada Cooperative Extension (UNCE) to train Master Gardener volunteers in recognizing problematic species and the damage they cause, before any invasions occurred. Using community members as "citizen scientists" has been successful in a number of subject areas (Corp, Rondon, & Van Vleet, 2013; Rosner, 2013). Master Gardeners are highly trained horticulture volunteers who donate many hours in community educational projects (McAleer, 2005; Bennett, 2012). After learning about invasive arthropods, they would then reach out to community and professional groups, giving information on problems from borers and other arthropod pests. These Master Gardeners received continuing education and project credit for their work.

## **Program Development and Delivery**

Staff from NDF and the Nevada Department of Agriculture (NDAg) met with the authors to develop the program in 2010. We elected to offer instruction in the northern and southern parts of the state separately, to concentrate on threats specific to these ecologically different areas. Preparation included development of educational materials, recruiting volunteers, creating flyers, and scheduling/delivering training.

Volunteers received one full day (8 hours) of training from the (NDAg) state entomologist. The class consisted of a PowerPoint presentation as well as a hands-on component where trainees examined samples of damaged tree parts and observed insect specimens under a dissecting microscope. They learned to recognize the signs and symptoms of infestation on trees. In addition, they learned how to prepare samples for examination and diagnosis.

While many arthropods can be destructive to trees, instruction focused on eight insects of greatest concern:

- Asian Longhorned Beetle

Emerald Ash Borer

- Goldspotted Oak Borer
- Honeylocust Borer
- Oak Splendour Beetle
- Redhaired Pine Bark Beetle
- Red Palm Weevil
- Sirex Wood Wasp

The northern training class consisted of 10 Master Gardeners, two UNCE personnel, three NDF staff, the USFS project leader, and three NDAg personnel. In the south, attendees included 21 Master Gardeners, three UNCE personnel, and two NDF staff, in addition to NDAg personnel.

Faculty and volunteers then contacted various groups across the state to set up workshops. Both the northern and southern areas committed to delivering a minimum of five workshops each over the course of the contract period. Audiences were composed of either professionals or community members or both. Classes were organized as 1-hour presentations with time for questions. By the beginning of 2013, over 700 people across Nevada had attended bark beetle workshops offered by 26 Master Gardeners, two UNCE faculty members, and the NDAg entomologist. In addition, faculty generated two Extension publications, and one faculty member wrote three articles that appeared in northern Nevada newspapers. Faculty worked with a graphic artist to create banners highlighting the most threatening insects. These have been on display at Extension offices in Las Vegas and Carson City, and at venues where the presentations were held.

**Table 1.**  
Teaching Bark Beetle Awareness

<b>Location (north/south)</b>	<b>Event</b>	<b>Presenter</b>	<b># Attendees</b>	<b>Professional</b>	<b>Residential</b>
North - Sparks	NDAg training	State Entomologist	19	9	10
North - Reno	Green Industry training	Master Gardener & UNCE faculty	19	6	13

North - Sparks	Nursery workshop	Master Gardener	11	2	9
South Las Vegas	UNCE Tree care seminar	Master Gardener & UNCE faculty	26	5	21
South - Pahrump	UNCE	Master Gardeners	25		25
North - Gardnerville	Green Living Festival	UNCE faculty	15	1	14
North - Reno	Radio show	UNCE faculty	Potential 16,000		
North – Carson City	Nursery Workshop	Master Gardener & UNCE faculty	6	3	3
South – Las Vegas	Master Gardener meeting	Master Gardener	100		100
South Las Vegas	Nevada Naturalist	State entomologist	12		12
South Las Vegas	Desert Green Landscape Conference	Master Gardeners	30	30	
North – Sparks	Pesticide Applicators course	State entomologist	28	25	3

South – Las Vegas	Tree Care Seminar	State entomologist	140	140	
North – Reno, Carson City, Gardnerville, Yerington	Master Gardener training (interactive video)	State entomologist	48	3	45
South – Las Vegas	Master Gardener meeting	Master Gardener	125	3	122
North – Reno, Carson City, Gardnerville	Green Industry Continuing Education	State entomologist	37	37	
South – Mt. Charleston	Fire Safe Council	Master Gardener & UNCE faculty	35	15	20
South – Las Vegas	UNCE awareness training	State entomologist	25	25	
South – Las Vegas	Nevada Naturalist	State entomologist	8		8
South – Las Vegas	Master Gardener training	State entomologist			
North – Reno, Douglas, Winnemucca	Master Gardener Training	State entomologist	40		40

Citizens need to be aware of threats to urban and native forests and of what they can do to keep

trees safe. The information on these threats has been incorporated into Master Gardener training and is included in educational events for professionals and the public. The grant expired in 2012, but instruction continues.

## Conclusion

UNCE Master Gardeners are a highly motivated and well-trained group of volunteer educators. The program described here expanded opportunities for Master Gardener community outreach. Their training and the classes they subsequently taught have raised public awareness of the damage invasive arthropods can cause. By developing a program to prevent or diminish problems, UNCE addressed threats before infestation struck urban forests. To date, none of the targeted pests has appeared in the state. If any of these insects were to appear, there are now hundreds of Nevadans trained to identify and report them to appropriate agencies.

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