

Invasive plants challenge scientists in face of environmental change

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Managing invasive plant species on the Great Plains has become more challenging in recent years in the face of human-caused environmental change, including the positive responses of invaders to altered atmospheric chemistry and longer growing seasons, says a University of Colorado at Boulder professor.

According to Professor Timothy Seastedt of CU-Boulder's ecology and evolutionary biology department, a warmer and longer growing season, increases in atmospheric carbon dioxide levels and nitrogen deposition on the Great Plains amplify the ability of weedy species to compete with native plants. Classic weed control techniques like pulling, mowing, herbicide treatments, fire and grazing that knock back invaders often leave ecological "vacuums" that can give other exotic plant species the chance for a foothold, he said.

"Things are hitting the fan in terms of environmental changes and their impacts on native plants," said Seastedt, also a fellow at CU-Boulder's Institute of Arctic and Alpine Research. "A number of invasive plant species have become better adapted for some of these altered Great Plains ecosystems than dominant native species."

Seastedt has been awarded a \$500,000 grant from the U.S. Department of Agriculture's Cooperative State Research Education and Extension Service to partner with Boulder Open Space and Mountain Parks, or OSMP, for a research, modeling and outreach effort on invasive plant species in the Boulder region. The project will focus on three weed

species viewed as threats to the conservation goals of OSMP, including Dalmation toadflax, Canada thistle and cheatgrass.

The USDA grant to Seastedt includes support for an employee who will be shared by OSMP. University of Wyoming Assistant Professor Aaron Strong, a former CU-Boulder doctoral student, also will participate in the project along with CU-Boulder researcher David Knochel, said Seastedt. The grant provides for an outreach effort by CU-Boulder and OSMP that will involve middle and high school students in Boulder County.

Seastedt said his team will attempt to control Dalmation toadflax -- an ornamental plant introduced into North America from south-central Eurasia in the 1800s -- using several methods, including the use of insects as "biocontrols," he said. In the late 1990s Seastedt and his colleagues successfully controlled knapweed, a member of the daisy family that was taking over some Boulder County grasslands, by using a species of weevil to consume knapweed seeds and foliage, relegating it to a roadside weed.

A second invader targeted in the new study is cheatgrass, a winter annual that germinates in the fall and which is native to Eurasia. Seastedt said the researchers may use grazing animals and re-seeding with native grasses to combat cheatgrass parcels in the county during fall through late spring. This would allow native grasses to grow through late summer and early fall in an attempt to exclude resources like water and nitrogen from winter annuals like cheatgrass, he said.

The third invader targeted is Canada thistle, an exotic species introduced in North America from southeast Europe and Asia in the 1600s. "This species is of particular concern because it does not seem to have any major natural enemies," said Seastedt. "We need to find some competitive, desirable plants to reduce its abundance. But it will

probably retain a presence in the county, specifically in parts of riparian habitats."

The middle school and high school students involved in the CU-Boulder project will be getting hands-on experience in working with different insect species that might be useful as control agents for invasive plant species, he said. "This effort will expose these students to real science, and hopefully kindle their interest in the many ecological changes occurring in the county, nation and world."

Seastedt said atmospheric pollution, climate change, exotic species invasions, extinctions and land fragmentation have altered virtually every ecosystem on the planet. Managers and biologists should be nurturing so-called "novel ecosystems" -- thriving combinations of desirable plants and animals in habitats that have never occurred together before -- and developing new conservation strategies for them, he said.

Source: University of Colorado at Boulder

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