When Natives Persist

One researcher examines how native plants can compete with invasives

The wording of this article has been adjusted to a 7-8th grade reading level. Andrea Barbknecht of the Wyoming Wildlife Federation made the revisions as part of the organization's curricula to engage kids in exploring their Wyoming landscape.

The original article, written by Tessa Wittman for Western Confluence *magazine, can be found here.*

By Tessa Wittman (May 2020)

In the spring of 2019, Elizabeth Leger drove to the edge of the 435,000 acres burned in the Martin Fire. She is a botanist at the University of Nevada, Reno and this was her field site. She was looking for cheatgrass. The 2018 wildfire was the largest in Nevada's history. Cheatgrass is frequently the first thing to grow after a fire on this landscape. As she approached the burned area, Leger didn't see the invasive grass. Instead, she found fields of blooming wildflowers. How did these **native** plants survive and thrive after the fire? What prevented the cheatgrass?

Leger studies what makes some individual plants and plant communities resistant to invasive species such as cheatgrass and resilient after disturbances such as fire. "Resistance," she says, "is the ability of the community to come back to some sort of native **trajectory** after disturbance." In her research, she works to identify the characteristics that enable some plants to outcompete or recover. Her work could help managers fight invasive species by encouraging native plants.

On a stormy day one year later, wildflowers blossom across the western edge of the lands burned in Nevada's 2018 Martin Fire. (Photo courtesy Beth Ledger.)

A nonnative species is considered "invasive" when it:

- Reduces how much life the ecosystem can support
- Reduces **biodiversity**
- Disrupts desirable ecosystem services
- Or drives sensitive species towards **extinction**

That happens when it outcompetes native species. Disturbance, like fire, can make invasion easier. The worst invasive weeds in the West are annuals, which germinate from seeds and live for one year. Native **perennials** form deep roots and come back year after year. Undisturbed sagebrush ecosystems contain a diverse community of shrubs, leafy plants, and grasses. They grow and blossom throughout the growing season. Each native species is one part of an ecosystem that works to cycle nutrients. When each of the parts is in place, the plant community can prevent invasive weeds from taking over.

"The problem," Leger explains, "is when you pull some of the parts out, that's when you make these windows for cheatgrass or other weeds to come in." For example, after decades of overgrazing and soil erosion removed some native species, cheatgrass invaded.

Elizabeth Ledger, a professor in the Biology Department at the University of Nevada, Reno, studies plant ecology and native plant restoration in invaded areas of the Great Basin. (Photo courtesy Beth Ledger.)

The usual approach to invasive annuals is to try to kill them across the landscape. Land managers invest huge amounts of time, money, and herbicides on invaded landscapes. They will never be able to eliminate all the weed seeds, though. At the same time, the **herbicide** treatments have the same effect as chemotherapy does on humans with cancer. They often kill healthy parts of the ecosystem as well as the invasive species.

Leger is researching unconventional solutions. Her curiosity was sparked after observing a half-burned hill. On the unburned side, native grasses and shrubs grew. The burned side was covered in cheatgrass. A few native grasses still lived in the cheatgrass. Leger collected the plants from both sides of the hill and began experimenting.

She wanted to identify the characteristics of plants that could compete with cheatgrass. First, she planted cheatgrass in plots with different mixtures of native plants. Then, she weighted the amount of cheatgrass produced in each plot. The weight on the cheatgrass was how she measured its success in invading. Native plants are more resistant when cheatgrass produces smaller plants and fewer seeds.

Leger spends time at her field sites and greenhouses measuring plants and digging up their root systems. This helps her understand the characteristics of plants that survive in invaded areas. She has found that for mature plants, the ones that turn green very early in the season and put a lot of energy into their roots are better competitors. These plants turn green after the first rains of the season. "Below ground," she says, "that's where all the fighting is in the Great Basin." Her most interesting finding is that small plants survive the best. Her theory is that plants that need less water and fewer other resources have a better chance of surviving when those resources are limited by competition.

Leger's research is helping make new management strategies. Seed producers were selecting bigger plants. Now they know that plants that are smaller, turn green early, and put a lot into their roots are more resistant to invasion. By selecting seeds with these characteristics, managers can get a leg up on cheatgrass. Also, knowing how important diverse communities are, managers are planting more native seeds in overgrazed and disturbed areas. By restoring native communities, they can help prevent things from getting worse after a fire. Leger is also trying to figure out how using cattle grazing can help fight back the invasive annual grasses. They can mow the grasses down early and give the later-growing natives a chance.

There is no one solution that will solve the problem. No single strategy will work in every place or every year. What we do know is planting a many different species with a variety of characteristics may make stronger and more resilient ecosystems. There are planting efforts at sites throughout the 435,000 acres burned in the Martin Fire. The spring of 2019 was wet, which helped native perennials get started on the western edge of the burn. Only time will tell how well the landscape can come back. Leger will return each season to collect data on the plant communities. She is searching for clues that will lead to wiser management approaches to fighting invasive species.

Glossary

Native A species that normally lives and thrives in a particular ecosystem

Trajectory A path towards functionality

Biodiversity The variety of life in a particular habitat or ecosystem

Extinction When there are no more individuals of a species in an ecosystem or in the world

Perennial A plant that lives for three seasons or more

Herbicide A chemical that kills plants