Grazing animals help spread plant disease

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Researchers have discovered that grazing animals such as deer and rabbits are actually helping to spread plant disease - quadrupling its prevalence in some cases - and encouraging an invasion of annual grasses that threaten more than 20 million acres of native grasslands in California.

The findings run contrary to what had been predicted by other theories, which had suggested that "consumers" such as deer would help to contain or reduce disease. They point once again to the complexity of natural ecosystems and the many ways in which plants, animals and even viruses interact with each other.

The work will be published this week in *Proceedings of the National Academy of Sciences*, by researchers from Oregon State University, Cornell University and the University of North Carolina.

"We usually think of a disease and its host as very tightly coupled, like a flu virus that infects humans," said Elizabeth Borer, an assistant professor of zoology at OSU. "But in natural ecosystems we're finding it's not nearly that simple, and to understand how plant pathogens work we have to consider the entire food web and many plant/animal interactions of which we are barely aware."

The work is of particular importance, researchers said, because so many elements of ecosystems are undergoing rapid change, from human manipulation, climate change, increase or decrease in various species, new invasive species, and other factors. Any one of those changes could

have ripple effects with seemingly unrelated diseases or other issues that are poorly understood - an increase in the abundance of white-footed mice, for instance, has been shown to increase Lyme disease risk in humans.

In this study, scientists examined the effect of herbivores and omnivores such as mule deer, rabbits and feral pigs on the prevalence of barley and cereal yellow dwarf viruses, which can infect more than 100 crop and non-crop plant species, reducing their growth and seed yield. This virus is a major concern for cereal crop production around the world.

In places where most plant eaters were kept out of test plots, the prevalence of this virus was only about 5 percent. It rose to 18 percent, a 3.6-fold increase, in areas that the animals grazed.

The grazers did not directly spread the plant virus, researchers said. Rather, they increased the amounts of annual grasses that are preferred by the aphids which play a role in transmission of this viral plant disease. That allowed for a much greater prevalence of the virus in areas where grazing took place.

"Even in complex natural communities, alternations to food web composition such as consumer invasion or extinction can lead to significant impacts that cascade through entire communities, including changes in infection risk," the researchers wrote in their report.

Source: Oregon State University