Cropping Alfalfa for Biodiversity Restoration Above & Belowground

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Marisol Berti is a professor in the Department of Plant Sciences, North Dakota State University (NDSU). She has a B.S. degree in Agronomy from Pontificia Universidad Catolica, Chile, and a M.S. and Ph.D. degree in Plant Sciences from NDSU. Her research experience includes forages, cover crops, and bioenergy crops production research. Her work includes the study of innovative ways to modify cropping systems to provide year-round soil cover to reduce soil erosion, enhance soil health and reduce leaching and runoff of nutrients. Her latest work is focused in novel ways to integrate alfalfa into annual cropping systems to increase resilience and stability of crop production. She has secured 7.8 million dollars in extramural funds for her research, but has been part of many other projects for a total of 23 million dollars. She has led large multidisciplinary, multi-institutional USDA-NIFA grants. She is author or-co-author of 90 peer-reviewed publications, 26 proceeding papers, 3 book chapters, numerous extension publications, and over 220 conference and symposia presentations.

Biodiversity is a key factor to maintain a healthy, resilient, and stable cropping system. As biodiversity decreases cropping systems are more susceptible to biotic and abiotic stresses that can lead to reduced productivity and detrimental effects to the environment. Alfalfa (*Medicago sativa* L.) is a key component in crop rotations offering numerous ecosystem services including enhanced above and belowground biodiversity. Above ground alfalfa high protein content in leaves attracts many arthropods, including many predators of insect's pests. Its flowers attract many pollinators providing them with pollen and nectar. Many other arthropods live below alfalfa's canopy such as ground beetles, spiders, crickets to mention a few which provide many functions to the microecosystem. Researchers have shown the number and diversity of species of ground arthropods is greater in alfalfa than in other annual crops. Belowground, the ability of alfalfa to fix atmospheric N2 in symbiosis with *Sinorhizobia* and its association with arbuscular mycorrhizal fungal communities increases the availability of nutrients for the crops but also for soil microarthropods and microbes. Biogeochemical process in the soil are driven by different groups of bacteria and fungi. These processes alter the soil structure promoting soil aggregation which in turn provides a habitat for different functional groups of microorganisms ultimate responsible for overall soil health. Previous research has found cropping systems including alfalfa have significantly greater fungal and bacterial biomass, diversity index, and richness in the soil compared with cropping systems including annual crops such as corn and soybean. Some efforts to integrate alfalfa into cropping systems are underway, however an effort to disseminate the benefits of alfalfa to growers to increase the inclusion of alfalfa in crop rotations is greatly needed.