The Alfalfa Research Program in USDA-ARS
The USDA-ARS Alfalfa Roadmap: Improving Alfalfa for 21st Century Farms and Markets
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Alfalfa research is currently conducted by scientists employed by the USDA-Agricultural Research Service (ARS) in nine laboratories located in Minnesota (Saint Paul), Wisconsin (Madison, Prairie du Sac, Marshfield), Maryland (Beltsville), Utah (Logan), Washington (Prosser, Pullman), and Iowa (Ames). The research is coordinated nationally through the ARS National Program 215: Pasture, Forage and Rangeland Systems. Every 5 years the program holds a series of stakeholder workshops to identify research problems, develop action plans, and coordinate research among locations. Scientists at each location then develop 5-year research project plans with specific research objectives and annual milestones. The plans are reviewed by a panel of peer scientists external to ARS for adequacy of approach, probability of success, and merit of the research. In addition, the ARS personnel involved in alfalfa research developed a national roadmap for alfalfa research to coordinate current research and to guide future initiatives. The overall goal of the alfalfa roadmap is to expand the presence of alfalfa across the landscape by increasing yield, reducing labor requirements for harvest and storage, enhancing utilization by animals, developing new uses, and amplifying environmental services provided by alfalfa. The roadmap consists of three routes. Route A focuses on genetic improvement of alfalfa using new tools that accelerate and enhance existing breeding programs. An advanced "breeder's tool box" will be developed that integrates phenotypic, genotypic, and molecular marker data. Initial targets are disease and pest resistance (Verticillium wilt, Aphanomyces root rot, stem nematode) and abiotic stress tolerance (salinity, drought). Route B will develop innovative harvest and storage technologies to enhance alfalfa feed quality and develop new uses. Current research combines use of a non-lodging biomass type alfalfa and a novel field harvester to separate alfalfa leaves and stems. Creation of these two separate product streams widens the harvest window, uncouples harvest time from stage of plant development, and reduces harvest losses by 30%. Research projects will investigate how the leaf and stem fractions can be used separately in biorefining or be recombined at ratios to optimize diets for dairy cows. Route C will develop and evaluate farming systems that strategically incorporate alfalfa to reduce the negative environmental impact of row crop and livestock agriculture. Included in this research are projects to identify the microbial communities and plant traits that contribute to the positive benefits of alfalfa in rotation with other crops, determine the extent and value of carbon sequestration and decreased nitrous oxide emissions from alfalfa-annual grain crop rotations, and develop cropping systems such as living mulches and alfalfa intercropping to improve annual crop production while maintaining soil health.