

ALFALFA: A SUSTAINABLE FOUNDATION FOR BIOENERGY CROPS

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The Plant Science Research Unit (PSRU) in St. Paul, MN, has an extensive research program focused on using alfalfa in bioenergy cropping systems. Research objectives of the PSRU include: 1) developing high-yielding, easily managed alfalfa for biofuel production; 2) modifying cell wall constituents to facilitate sugar availability and increase biofuel output; 3) characterizing alfalfa genes that limit cell wall biofuel potential; and 4) assessing the economic and environmental contributions of alfalfa in cropping systems with other biofuel crops. Production of bioenergy crops currently focuses on species that require nitrogen fertilizer inputs (i.e., maize, switchgrass, sorghum, sugarcane). Application of nitrogen fertilizer reduces the net energy gain from bioenergy crops because production and use of chemical fertilizer is energy intensive and expensive. Moreover, little thought has been given to how growing grass bioenergy species in monocultures across the rural landscape affects diversity, water quality, energy yield, and sustainability. Perennial legumes such as alfalfa can make their own nitrogen fertilizer through symbiotic nitrogen fixation. Thus, they need no added nitrogen fertilizer for excellent growth. In addition, the crops grown in rotation with alfalfa need little, if any, nitrogen fertilizer, thereby reducing the energy inputs and saving the farmer money. Rotating alfalfa with bioenergy grass crops such as corn can improve soil quality, reduce disease incidence, provide nitrogen fertilizer, protect water resources, and add much-needed diversity to the bioenergy cropping scheme.

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