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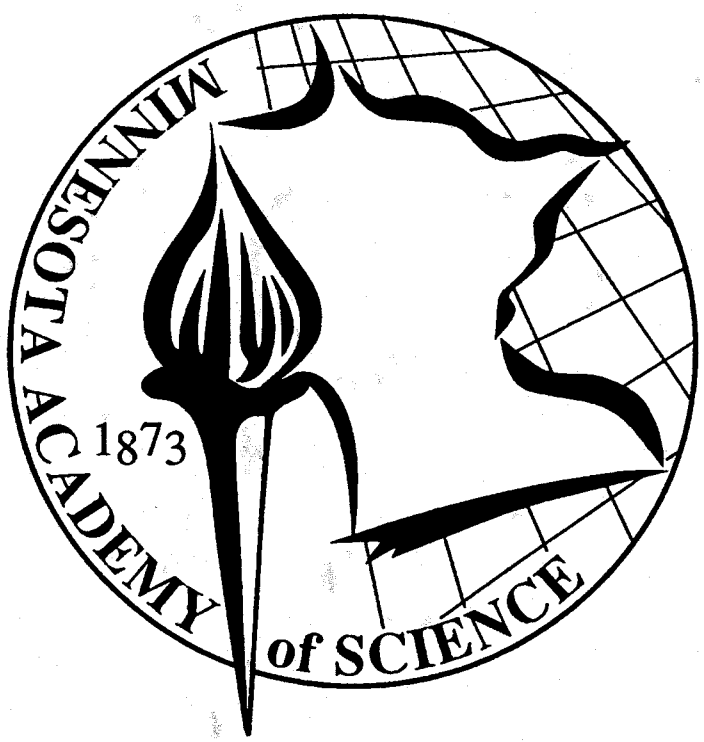

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potential uses in sustainable agriculture systems, however, additional research is needed to clearly define their niche, especially in the upper Midwest. A large (>500 accessions) germplasm collection was assembled from international sources and is being screened, characterized and evaluated for adaptation, growth rate, biomass production and carbon sequestration capability under the short-growing season of the upper Midwest. The objectives of this study are to identify adapted accessions with the maximum combination of: 1) rapid growth rate, high nitrogen fixation rate in symbiosis with the soil bacterium *Sinorhizobium*, and large biomass production, 2) adequate levels of *Phytophthora* root rot resistance required under cool, wet soils, 3) dual utilization as forage or hay, 4) shade tolerance as companion crops, and 5) high below ground carbon storage capacity.

DEVELOPMENT OF *CUPHEA* AS A UNIQUE OILSEED CROP FOR THE U.S.

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Saturated plant oils composed of small and medium-chain triglycerides (i.e., C8:0 to C14:0) are extensively used in the chemical manufacturing industry. Yet, in the U.S. there currently are no crops grown to meet industrial demands. Several species from the genus *Cuphea* produce large quantities of such oils and some have potential for agronomic domestication. Recently, semi-domesticated lines developed from an interspecific cross between *C. viscosissima* and *C. lanceolata* have been shown to be successfully grown in west central Minnesota. Cuphea offers to be a true alternative crop that could be used in rotations that are already lacking in diversity. Our research with semi-domesticated cuphea has focused on developing agricultural management practices for its production and identifying potential environmental and agronomic limitations. Utilizing row-cropping equipment common to Midwest farmers, we have been relatively successful in establishing cuphea, and producing seed yields as high as 1.0 Mg ha^{-1}. We have found that cuphea may be susceptible to drought, and heat-stress when incurred at reproductive phase. Difficulties associated with weed control, seed harvesting and processing still exist. Although some obstacles still remain, results appear favorable for agronomic production of cuphea in the near future.

SIMULATION MODELING TO PREDICT THE ADOPTION AND ECONOMIC VALUE OF A CROP TECHNOLOGY INNOVATION

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Simulation modeling is a useful tool for identifying the potential impacts of technology innovations. The use of simulation modeling in this capacity is illustrated for the case of a temperature-sensitive polymer seed coating that has recently been introduced. This information is important both to a company who is trying to market the new technology and to the potential users of the technology. For this analysis, we take the perspective of a typical farmer as a potential user of the technology. Simulation modeling is used in three ways in the analysis. The effect of random weather events and cropping system are used in the EPIC simulation model to: 1.) identify field conditions that determine *when* the technology can be used and 2.) identify crop yields and production costs that quantify *what* happens when the technology is used. Finally, an economic model is constructed using a decision-tree approach to 3.) incorporate the *when* and *what* into the user's management plan to see *how* the technology will be used. Integrating these three components provides a framework for predicting the extent to which this new technology will be used, the effect of the technology on cropping practices, and the economic value of the technology to crop producers.

SALT AFFECTED SOILS IN SOUTH DAKOTA

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Throughout much of the central Corn Belt, soil salinity problems seldom are a significant impairment to the production of agronomic commodities. However, as we look to the western edge of the Corn Belt, the area where evapotranspiration exceeds precipitation, we find that because drainage is less developed, salts are less apt to be carried out of a watershed, and soil salinity problems can and do occur more frequently. Naturally high levels of soil salinity are often found, farming tillage practice induced soil salinity has been documented, and irrigation induced salinity has been responsible for causing cropping system failures. An overview of how salinity can naturally cause problems and how man has contributed to Salinization problems will be discussed. A discussion of how management can be used to minimize salt problems concludes the discussion.