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U.S. Department
of Transportation



**Title: Feasibility and Environmental Impact of Switchgrass Grown
for Biofuel on Marginal Quality Lands**

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Project Goal

The long-term goal of the project was to promote environmentally sustainable biofuel feedstock production on marginal quality land under rain-fed vs. irrigated conditions. The objectives were to: 1) Determine the impacts of different soil salinity levels on switchgrass germination, establishment, and yield; 2) Determine the relative production potential of different switchgrass varieties under rain-fed and irrigated conditions on marginally saline soil; 3) Assess carbon sequestration and management inputs of switchgrass grown on marginal quality land; and 4) Generate information on best management practices using ecosystem simulation models.

Project Outcomes

- Greenhouse experiment indicated that switchgrass had a moderate level of salinity tolerance. It would grow well without dramatic biomass reduction when soil salinity is below 7 dS m⁻¹.
- Switchgrass yield will be dramatically reduced when soil salinity exceeds 7 dS m⁻¹ or under drought conditions, since drought would concentrate soil salts.
- In Colorado, frequent irrigation was necessary during the first 2 months of establishment for successful establishment of switchgrass with N fertilization increasing weed pressure.
- Switchgrass grew well under limited supplemental irrigation on marginal quality soils.
- Significant differences in yield were observed among varieties. Blackwell, Pathfinder and Trailblazer have a higher biomass yield than other varieties. The average yields ranged from 8.6 to 10.3 Mg ha⁻¹. However, without supplemental irrigation, all varieties declined, showing decreased biomass production over time.
- According to the DAYCENT model, the best management should be irrigated every 14 days at 70% PET irrigation water and fertilizer at 67 Kg N ha⁻¹ yr⁻¹, producing biomass yield of 9.40 Mg/ha, with a high carbon sink potential at 2.04 Mg CO₂ equivalent ha⁻¹ yr⁻¹.



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