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Transpiration and Water-Use-Efficiency Differences between *Pascopyrum smithii* and *Panicum virgatum*

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Abstract Text:

I investigated the differences in transpiration and water-use-efficiency between western wheatgrass (*Pascopyrum smithii*) and switchgrass (*Panicum virgatum*), native grasses of the Northern Plains. Western wheatgrass is a cool season upland native forage grass, whereas switchgrass is a warm season, wetland native grass species. The study was conducted at the USDA Agriculture Research Station south of Mandan ND, with Dr. Rebecca Phillips as supervisor and advisor. Transpiration, photosynthesis, leaf water potential, soil moisture, and soil temperature were measured to compare water use efficiencies (a measure of how much water is used per mol of CO₂ fixed) and transpiration. The western wheatgrass transpired more water during photosynthesis than switchgrass ($p < 0.001$). Water-use-efficiency was greater for switchgrass than for western wheatgrass ($p < 0.001$). When considering planting switchgrass or western wheatgrass in the Northern Plains region, switchgrass may be more drought tolerant in the summer, and therefore a potentially better biofuels feedstock.

Impact Statement:

By contributing to our understanding of switchgrass and western wheatgrass and their relative resistance to drought the USDA and its research component ARS can better advise growers on the best crop species to use for biofuels feedstock under anticipated continuance of drought in the Northern Great Plains. Selection of the best species will in turn minimize water demand.