PRECIPITATION PARTITIONING IN SHORT ROTATION BIOENERGY CROPS: IMPLICATIONS FOR DOWNSTREAM WATER AVAILABILITY

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The southern United States is a potential leader in producing biofuels from intensively managed, short rotation (8–12 years) woody crops such as southern pines, and native and non-native hardwoods. However, their accelerated development under intensive management has raised concerns that fast-growing bioenergy crops could reduce recharge to stream flows and groundwater, relative to other land cover types or less intensively managed woody crops. In this study, we characterize and compare the partitioning of precipitation into interception, transpiration, throughfall, infiltration, and soil evaporation for 12-year-old, intensively managed loblolly pine (*Pinus taeda*) and sweetgum (*Liquidambar styraciflua*) stands at the Department of Energy Savannah River Site in New Ellenton, South Carolina. Three replicate plots of each species were instrumented with sap flow probes, box lysimeters, integrated temperature and soil moisture probes, precipitation gauges, and throughfall gauges to allow estimation of the components of the total water balance and to parameterize process-based models. Preliminary soil moisture measurements show that annual Relative Extractable Water (REW) is similar between sweetgum and loblolly pine plots (0.43); however, REW was significantly lower in sweetgum compared to loblolly plots in the summer (0.41 vs. 0.53), but higher in early spring months (0.63 vs. 0.58). These results suggest comparable annual water use by sweetgum and loblolly pine, but higher water use by sweetgum than pine during the growing season, and higher water use by loblolly pine than sweetgum during the dormant season. This work will provide key insights on the implications of bioenergy crop expansion in the South for loblolly and sweetgum.

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Citation for proceedings: Stringer, Christina E.; Krauss, Ken W.; Latimer, James S., eds. 2016. Headwaters to estuaries: advances in watershed science and management—Proceedings of the Fifth Interagency Conference on Research in the Watersheds. March 2-5, 2015, North Charleston, South Carolina. e-Gen. Tech. Rep. SRS-211. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 302 p.