Soil and litter macro-invertebrate community dynamics as influenced by fertilizer and drought treatments in loblolly pine on the Virginia Piedmont

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ABSTRACT: Macro-invertebrates in forest soils are a diverse group of organisms that are key drivers of processes such as decomposition, nutrient cycling, and soil aeration. Intensive silvicultural practices such as fertilization may impact soil macro-invertebrate communities, thus potentially altering the rate of litter decomposition and nutrient cycling. Our research objective was to survey and compare the diversity and abundance of soil and litter macro-arthropods in response to drought simulation and fertilization in a mid-aged, 11 year-old, loblolly pine (Pinus taeda) stand. The experimental site was located on the Virginia Piedmont in the Appomattox-Buckingham State Forest. A randomized complete block design was used with a two by two factorial of treatments (fertlilization x throughfall reduction) and four blocks. The stand was fertilized at age nine with 200, 25, and 50 lbs per acre of nitrogen, phosphorous, and potassium, respectively. Half of the plots were exposed to a thirty percent throughfall reduction treatment. Soil was sampled with a soil auger to a depth of 10 cm at each plot. Soil was sieved through a 2mm mesh screen and handpicked for macro-arthropods. Litter macro-arthropods were captured in modified Tullgren funnels for five days. The Shannon-Weiner diversity index was used to analyze the data. The impacts of treatments on soil and litter macro-invertebrate abundance and diversity will be discussed with ramifications on carbon and nutrient cycling discussed.

KEYWORDS: loblolly pine, soil arthropods, litter arthropods, fertilizer, drought