THE EFFECT OF SITE DISTURBANCE ON NITROGEN AND PHOSPHORUS AVAILABILITY IN INDIANA OAK-HICKORY FORESTS

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Abstract: Nitrogen (N) and phosphorus (P) are nutrients often limiting forest site productivity. Soil water availability, soil temperature, and litter substrate quality interact to control the availability of these mineral nutrients and these factors can be directly altered by site disturbance. This study will examine the effects of site disturbance at three oak-hickory dominated forests of varying productivity. The study will utilize both field and controlled environment experiments. The objectives of the study are: 1) to determine the effects of disturbance on N and P availability, 2) to determine how sites of varying productivity respond to site disturbance, and 3) to determine the effects of varying soil water availability on N and P mineralization rates. The disturbances created are: (1) removal of litter and forest floor organic layers to the mineral soil, (2) incorporation of the forest floor with the mineral soil to a depth of 20 cm, (3) ground fire, i.e. burning the forest floor, and (4) an undisturbed control N and P availability will be determined using mixed bed anion/cation ion exchange resins. In the field, resins will be buried in the mineral soil at a depth of 20 cm. In the controlled environment study, intact soil monoliths measuring 15 cm in diameter and 30 cm in length will be maintained at either high or low soil water potentials to determine the effects of water availability on N and P mineralization rates as determined by ion exchange resins. Temporal changes in ammonium (NH_4^+), nitrate (NO_3^-), and phosphate (PO_4^{2-}) availability in response to these site disturbance treatments will be determined.

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