Accumulation of N and P in Tree Biomass Following Poultry Litter Application. (S07-friend074915-Oral)

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Abstract:

If forests are to receive repeated applications of animal waste, it is essential to know the degree to which nutrients will be removed upon harvest. We investigated N and P accumulation in harvestable tree biomass of a ten-year-old loblolly pine stand, growing on an upper Coastal Plain Ultisol. The stand was thinned and then treated with three rates of manure application: I. 0 Mg litter/ha, 0 kg N/ha, 0 kg P/ha; II. 5.6 Mg litter/ha, 200 kg N/ha, 92 kg P/ha; and III. 23 Mg litter/ha, 800 kg N/ha, 370 kg P/ha. The growth of non-pine vegetation was controlled by intensive herbicide applications to all plots. After two growing seasons, tree height was unaffected but basal area was 17% greater in treatments II and III compared with I. Total biomass, estimated from locally developed allometric relationships, was 49, 57, and 59 Mg/ha in treatments I, II, and III respectively. Ecosystem N accumulation was dominated by soil N (80%) and was not very responsive to treatments. Tree biomass accounted for 160, 200, and 260 kg N/ha, respectively, in the treatments. Ecosystem P was defined as biomass P plus soil extractable P (Mehlich III). Large amounts (60-80%) of ecosystem P were contained in biomass, especially in the forest floor, and ecosystem P was very responsive to treatments. There was a ten-fold increase in ecosystem P from treatment I to treatment III. Tree biomass accounted for 10, 21, and 23 kg P/ha, respectively, in the three treatments. Based on the intermediate treatment (II), whole-tree harvest could remove 100% of N added but only 20% of P added in poultry litter. This disparity between N and P removal is consistent with tree nutritional demands and suggests that repeated applications of poultry litter, without N amendment, could result in P accumulation problems, as have been seen in pastureland settings.

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