

Humic substances from vermicompost enhance urban lettuce production

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Abstract Urban agriculture is growing worldwide with the growth of cities. Urban agriculture represents about 20 % of Cuban agriculture. In Cuba, urban agriculture is institutionalized and organized with ecological principles. For instance, local agriculture enhances food security and decreases the use of nonrenewable fertilizers. However, organic crop production in urban environments is challenging because of intensive plant nutrient requirements and disease incidence. Here, we tested an innovative technology based on plant growth promoters isolated from vermicompost and applied directly to lettuce leaves. We monitored plant metabolism by measuring the activities of nitrate reductase, an enzyme linked to N assimilation, and of phenylalanine ammonia lyase, an enzyme linked to plant defense. The experiment was conducted in the organic urban system in Guines, Cuba. We applied liquid humates at 10, 15, or 20 mg C L⁻¹ once at the seedling stage and again 15 days after transplantation. Our results show that humates at 15 mg C L⁻¹ shortened by 21 days the lettuce production cycle, allowing early harvesting without changing quality while increasing yields expressed as the number of leaves per plant. Humate application also decreased total carbohydrate, increased protein, increased nitrate uptake, and stimulated nitrate reductase and phenylalanine ammonia lyase in lettuce leaves.

Keywords Humic substances · Physiological effects · Organic agriculture · Urban agriculture · Nitrogen metabolism · Biostimulant