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**Climate and soil effects on performance
attributes of *Stevia rebaudiana* (Bertoni)
in Ecuador**

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Abstract

The leaves of *Stevia rebaudiana* B. have a 15 to 30 times and the extracted steviol glycosides (SGs) even a 250 to 450 times higher sweetening power than sucrose. The SGs have recently been allowed for Europe, opening new interesting market potentials. The tropical climate and the edaphic conditions in the northern Ecuadorian Amazon region are potentially favorable for the *Stevia* cultivation which could present an alternative income for small scale farmers. Nevertheless, experiences in the region with *Stevia* production are scarce. The objective of the research was to assess the effect of different climatic conditions and soil types along an altitude gradient on performance attributes of *Stevia* in Ecuador. Two experiments were conducted in 2012, involving a) the *in-situ* performance of *Stevia* at three sites with different soil types, and b) a supplementary cross comparison trial using potted soil translocated from all three sites and evaluated under the specific climatic settings of the sites for *Stevia* performance during a 12-week period. While heterogenous soil characteristics caused significant variations of plant performance attributes among sites, differences in climatic conditions did not result in significant variations of crop performance. At Bajo Talag (506 m.a.s.l.) *Stevia* showed the best performance for all measured attributes with a SG concentration in the leaves of 12.04% and a leaf biomass of 1.17g plant⁻¹. The haplic Regosol of this site possesses moderate soil fertility, an acidic pH 5.4, high contents of C_{org} (6.2%) and total N (0.5%), medium content of K (0.23 cmol kg⁻¹), a low content of available Olsen-P (6.6 mg kg⁻¹) and a silty loamy sand texture. At Alto Pano (729 m.a.s.l.) the main soil-related restriction for the *Stevia* growth was the high content of organic matter (12.0 % C_{org}), forming a thick mat, hindering the penetration of roots and retaining excessive amounts of water. The yields were a leaf biomass of 0.32 g plant⁻¹ and a SG concentration of 7.25%. At Jatun Sacha (414 m.a.s.l.) a high soil clay content led to water stagnation after rainfall events and surface soil cracking after drought periods. This negatively affected *Stevia* growth with a leaf biomass of 0.39g plant⁻¹ and a SG concentration of 9.3%. All studied plant attributes were strongly correlated, indicating that the environmental parameters influence to the same extent *Stevia* performance. Despite average SG concentrations and crop yields that were lower than those reported in literature, the northern Ecuadorian Amazon region may offer favorable conditions for *Stevia* production, particularly on sand loam-textured soils, and irrespective of the altitude. Crop performance may be improved, particularly by selecting adapted genotypes, moderate fertilizer application and protection against fungal diseases.

Keywords: Leaf dry weight, plant height, soil fertility, steviol glycosides.