

## The Effect of Multiple Environmental Conditions on *Acacia senegal* Seedling's Carbon, Nitrogen, and Hydrogen Contents: An Experimental Investigation

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**Abstract :** This study was conducted in light of continual global climate changes that projected increasing aridity, changes in soil fertility, and pollution. Plant growth and development largely depend on the combination of available water and nutrients in the soil. Changes in the climate and atmospheric chemistry can cause serious effects on these growth factors. Plant carbon (C), nitrogen (N), and hydrogen (H) play a fundamental role in the maintenance of ecosystem structure and function. *Acacia senegal* (Acacia senegal), which produces gum Arabic, supports dryland ecosystems in tropical zones by its potentiality to restore degraded soils; hence it is ecologically and economically important for the dry areas of sub-Saharan Africa. The study aims at investigating the effects of water stress (simulated drought) and poor soil type on *Acacia senegal* C, N, and H contents. Seven days old seedlings were assigned to the treatments in Split-plot design for four weeks. The main plot is irrigation interval (well-watered and water-stressed), and the subplot is soil types (silt and sand soils). Seedling's C%, N%, and H% were measured using CHNS-O Analyzer and applying Standard Test Method. Irrigation intervals and soil types had no effects on seedlings and leaves C%, N%, and H%, irrigation interval had affected stem C and H%, both irrigation intervals and soil types had affected root N% and interaction effect of water and soil was found on leaves and root's N%. Synthesis application of well-watered irrigation with soil that is rich in N and other nutrients would result in the greatest seedling C, N, and H content which will enhance growth and biomass accumulation and can play a crucial role in ecosystem productivity and services in the dryland regions.

**Keywords :** *Acacia senegal*, Africa, climate change, drylands, nutrients biomass, Sub-Saharan, Sudan

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