

Eddy-Covariance Measurement of Carbon-Dioxide Concentration and Turbulent Flux above Cowpea (*Vigna unguiculata* (L.) Walp) at an Agricultural Site in Ile-Ife, Nigeria

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This study investigated the Net Ecosystem Exchange (NEE) over a leguminous plant, cowpea (*Vigna unguiculata* (L.) Walp) at an agricultural site in Ile-Ife, Nigeria monitored during two transition seasons: dry-to-wet (March-June) and wet-to-dry (August-November) in 2015. Measurements of carbon dioxide (CO₂) concentration and turbulent flux were made by eddy-covariance (EC) method alongside Photosynthetically Active Radiation (PAR) and net radiation. Physiological parameters (e.g., Leaf Area Index, plant height and surface albedo) were observed throughout the growth stages of the plant; from emergence to senescence. High levels of CO₂ mass concentrations, between 850.0 mgm⁻³ and 1200.0 mgm⁻³, were found in the nighttime periods. But in the late afternoons, around 1500 hrs LT, pronounced minima values of about 650.0 mgm⁻³ were recorded. Arguably, the level of intensity of PAR is a dominant factor modulating the depletion of the mass concentrations of CO₂, from its emergence (beginning of vegetative) to senescence. Therefore, it can be concluded there was a net uptake of carbon dioxide by the cowpea, irrespective of the developmental stage of its growth.

Keywords: Cowpea (*Vigna unguiculata* (L.) Walp), developmental stages, CO₂ concentration and flux, Net Ecosystem Exchange, seasonal transitions.