

Earthworm populations and cast properties in the soils of oil palm plantations

ABSTRACT

Oil palm plantations generate a substantial amount of agricultural by-products, such as oil palm empty fruit bunches (EFB) and fronds. These by-products are commonly recycled in the oil palm plantations in order to obtain plant nutrients through decomposition. Information on earthworm species and populations and their cast properties in oil palm plantations in different soil types and oil palm tree ages is still lacking. The population and diversity of earthworms, casts and soils were surveyed in 10 m transects using 5 of 25 cm² quadrat. In all sampling sites, only an endogeic species, *Pontoscolex corethrurus* Müller discovered. The earthworm population densities were influenced by the age of the oil palm trees and soil types. Under similar soil types and different oil palm ages, the earthworm population densities were inversely related. Four major factors which dictated the heterogeneity of earthworm population in oil palm plantation were: (i) food and soil physical habitat, (ii) exchangeable calcium, (iii) pH, and (iv) exchangeable potassium as determined by principal component analysis (PCA). The earthworm population was positive significantly related to the CEC and exchangeable Ca in the soil ($R^2=0.66^*$, $n=100$). With the exception of the soil C:N ratio, all other soil chemical properties (pH, C, N, total P, plant available P, total K, total Mg, CEC, exchangeable- K, Ca and Mg) were significantly correlated with the earthworm cast properties. Available P was 509 % higher in casts than in the surface soil ($r=0.63^*$, $n=100$). The cast CEC and exchangeable Ca were strongly correlated with the soil CEC and exchangeable Ca in soil. However, the increase in CEC and exchangeable Ca were 67 and 98%, respectively. The earthworm population was highly correlated with soil CEC and exchangeable Ca.

Keyword: Oil palm; Earthworm; *Pontoscolex corethrurus*; Soil factors; Principal component analysis