

INFLUENCE OF SOME NON-CROP TRADITIONAL AGROFOREST TREES ON SOIL CHARACTERISTICS, VEGETATIVE GROWTH AND YIELD OF CASAVA, CORN AND COCOYAM IN THE MAMPONG VALLEY

Manteaw, Grace.

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ABSTRACT

This study was conducted at the United Nations University West Africa People's Land-Use and Environmental Change (UNU/WAPLEC) demonstration site in Gyamfiase-Adenya, Amanase-Whanabenya and Sekesua-Osonson located in southern forest-savanna transition zone of Ghana. Focus group discussions (FGDs) in the three selected locations in the study area indicated that non-crop trees that are commonly left *in situ* on farms in traditional agroforestry practises in the study area included species such as *Albizia zygia*, *Alstonia boonei*, *Anthocleista nobilis*, *Antiaris africana*, *Blighia sapida*, *Blighia unijugata*, *Blighia welwitschii*, *Bombax buonopozense*, *Cassia alata*, *Ceiba pentandra*, *Cola gigantea*, *Dialum guineensis*, *Ficus exasperata*, *Ficus sur*, *Ficus sp.*, *Holarrhaena floribunda*, *Khaya ivorensis*, *Mangifera indica*, *Morinda lucida*, *Newbouldia laevis*, *Oncoba spinosa*, *Parkia biglobossa*, *Persea americana*, *Rauvolfia vomitoria*, *Spathodea campanulata*, *Spondias monbin*, *Sterculia tragacantha* and *Terminalia ivorensis*. Deliberate floral inventory within the selected area (Gyamfiase-Adenya UNU/WAPLEC demonstration site) indicated that the following tree species had the highest frequency and density: *Albizia zygia*, *Blighia sapida* and *Parkia biglobossa* with the highest frequency (66.7%) and with density (3.2) followed by *Morinda lucida*, *Dialum guineensis* and *Antiaris africana* with a frequency of 58.3% and density (2.1) whereas *Blighia welwitschii*, *Cassia alata*, *Ficus sp.*, *Holarrhaena floribunda*, *Khaya ivorensis* and *Oncoba spinosa* with the lowest frequency (8.3%) and density (0.1). This implies that some of the selected non-crop trees were preferred species. Results of the floral inventory indicates that these trees are readily available in the study area and may be found in the following land-use types: Fallows (F), Annual crop farms (fA) and Tree/cash crop farms (fT) with the highest frequency occurring in the annual crop farms. Tree-crop compatibility study indicated that generally, there was an increase in both vegetative growth (stem diameter, height, leaf numbers and leaf area) as well as yield of cassava and corn growing in different 2m concentric rings as planting distance increased away from the bole/trunk of virtually all the selected non-crop agroforest trees that were left *in*

situ on farms in the study area, with the exception of *Cola gigantea* where an increase in planting distance away from its bole resulted in a decrease in vegetative growth. There was an increase in light intensity as distance of 2m concentric rings increased away from the bole of each selected non-crop agroforest tree species that was studied. The moisture content of the soil closer to the bole of virtually each non-crop agroforest tree that was significantly higher than it was in the soil farthest away from the bole/trunk of the tree. [In general, there were significant differences among the selected non-crop tree species on their influence on soil (%N, Organic carbon, Ca, P, K) studied]. A descending order of magnitude of the trend of total % soil nitrogen content was observed in the soil under the canopy of the trees, with *Terminalia ivorensis* > *Cola gigantea i* > *Albizia zygia* > *Morinda lucida* > *Cola gigantea ii* > *Ceiba pentandra* *Adenya* and *Cola gigantea* > *Bombax buonopozense* > *Ceiba pentandra* > *Terminalia ivorensis* *Bewase*. However, a descending order of magnitude of the trend of % soil organic carbon content was: *Albizia zygia* > *Morinda lucida* > *Cola gigantea i* > *Ceiba pentandra* > *Terminalia ivorensis* > *Cola gigantea ii* at *Adenya* and *Cola gigantea* > *Ceiba pentandra* > *Bombax buonopozense* > *Terminalia ivorensis* *Bewase*. For phosphorous, potassium, pH in the soil, in the 2m concentric rings, the trends were variable depending on the type of tree. Calcium was highest in the soil under the canopy of *Morinda lucida*. The soil in each 2m concentric ring under the canopy of each of the selected non-crop agroforestry tree species that was studied contained an optimal amount of moisture, mean % nitrogen, mean % organic carbon, calcium, phosphorous and potassium content (i.e., these were not limiting factors), the increase in vegetative growth as well as yield of the cassava and corn observed in this study may most probably be due to increase in the mean light intensity as planting distance increased away from the bole/trunk of each selected non-crop agroforestry tree.

SUPERVISORS

Prof. Enu-Kwasi, L.

Prof. Danso, S.K.A.

Dr. (Mrs.) Osei-Sarfo, Dorcas