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**Influence of Land Use Systems on the Organic Matter Dynamics in  
the Upper Ouémé Catchment in Benin**

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**Abstract**

This study analyses the influence of the land use systems on the organic matter dynamics. In the upper Ouémé catchment in Bénin, the villages of Dogué and Sérou were selected respectively according to two criteria: villages, with and without, land to clear. Four land use systems have been determined in each village: forests, fallows, cashew plantations and seasonal crops. Observations and quantitative data collection began in June 2001.

The litter production during the period June 01 – March 02 is higher in the Serou forest (6.8 T/ha) and in cashew plantations (4.0 and 3.5 T/ha, respectively in Sérou and Dogué) than in the annual crop systems and in the fallow land. The litter production under forest and cashew plantations in Sérou was higher than in Dogué. In the former site, sandy soils result in quick water loss, increased litter fall and slow litter decomposition. On the contrary, in other systems like on fallow land or in the forest of Dogué, bush fires and the burning of the harvest residues destroy all the litter and recycle the carbon in form of gases into the air. The cashew systems as well as the forest of Sérou are carefully protected against the fire. During the study it has been found out that every year, the waste of biomass through burning is approximately estimated at 3.2 and 2.6 T/ha, respectively in Dogué and Sérou. Finally, the CO<sub>2</sub> emission through the soil, which reflects the soil organic matter, was higher (13.9–17.1 kg/ha h) in the forest than in the other land use systems and was, in general, higher in Dogué than in Sérou (except in the forest).

Summary, the forest of Sérou as well as the cashew plantations in Dogué and Sérou can be defined as a CO<sub>2</sub> sink. The CO<sub>2</sub> emission through the soil under different land use systems was higher in rain season. The burning and deforestation are important factors of the CO<sub>2</sub> emission in upper Ouémé Catchment.

**Keywords:** Biomass production, land use, soil CO<sub>2</sub> emission, water use efficiency