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The Effect of Rainfall Intensity on Soil Erosion and Runoff for Latosol Soil in Indonesia

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ABSTRACT

Soil erosion is the most serious problem of land degradation in Indonesia. However, limited report has been documented. The erosion problem in Indonesia, particularly in Java, has been at an alarming rate. The fundamental case of soil erosion is the rain effect upon the soil. Rainfall intensity and soil characteristics are related to soil erosion and runoff. The objective of this research was to study the relationship of rainfall intensity, soil erosion and runoff in latosol soil. An experiment was conducted using plot size 22 m in length and 2 m in width and 9 % slope. A field experiment was conducted with rainfall intensity observation for 3 months, to collect soil erosion and runoff in the soil collector. A laboratory experiment was done using rainfall simulator instruments with rainfall intensity of 2.3, 3.4, 4.5, 5.6 cm/hr and 8 % slope each with 3 replications. The result of the experiments showed that soil erosion was 3.14 t/ha and runoff was 33.20 m^3/ha. When the rainfall size increased the soil erosion and runoff also increased. The correlation coefficient between EI30 (Interaction I30 and energy) and soil erosion was positive.

Key Words: Rainfall intensity, Soil erosion, Latosol soil

INTRODUCTION

Soil erosion is the removal of soil from land surface by running water (Schwab *et al.*, 1981). It is a process of soil detachment and transportation from soil agent of erosion (Arsjad, 1989). While it is generally acknowledged that erosion is serious in Indonesia, no analytical or systematic studies have been undertaken to document watershed; records of 6.0 mm/year and 1.7 mm/year were calculated from sediment concentration (Sinukaban, 1989).

Under intense tropical condition with large amount of rainfall, severe soil erosion results (Barus and Suwardjo, 1977). The situation is aggravated by the rough terrain and steep topography in the mountainous area of Java, Sumatera, Sulawesi, The Lesser Sunda Island and Irian (Sinukaban, 1989). Thus erosion damage resulting from floods occurs widespread in Indonesia (Barus and Suwardjo, 1977).

Rainfall is high during wet season, which results in increase of soil erosion (Hardjowigeno, 1989). Large area of latosol is found in Cisadane Watershed. Most of land is used for agriculture. Total critical land in Cisadane Watershed is 14733 ha and mostly situated in Bogor District (Sukartaatmadja, 1992). Intense rainfall in erosive soil, steep slopes and poor land management in Indonesia can cause serious soil erosion and water pollution (Arsjad, 1989).

Latosol soil in Indonesia is important for agriculture, but soil erosion especially in land with slopes, and high rainfall intensity tends to be high. Therefore, it need protection from soil damage (Sukartaatmadja, 1992). Research on rainfall intensity, soil erosion and runoff is needed for protection of soil from erosion damage (FAO, 1965).

The purpose of this research was to study the effect of rainfall intensity on soil erosion of latosol. The most important characteristic of soil in relation with soil erosion was erodibility . The research was to determine the value of soil erodibility.

MATERIALS AND METHODS

Plot size of 22 m x 2 m and land with 9 % slope was used for field experiment. The field experiment had a soil collector for measuring soil erosion and runoff after each precipitation. The experiment was conducted at the experiment station, Bogor Agricultural

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