

礫石敷蓋與混合對土壤沖蝕影響之研究

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摘 要 台灣地區降雨量高，土壤沖蝕嚴重，在沖蝕過程中土壤之細顆粒較易流失，遺留下之礫石量相對增加，改變土壤之成份，對於土壤抗沖蝕能力亦有相當的影響。為瞭解土壤礫石對於土壤沖蝕之影響，本研究利用台灣西部佈較多之黃壤（砂質壤土）及紅壤（坩質粘壤土）為實驗土樣，將過篩處理之土壤（粒徑 $<2\text{mm}$ ），以表面敷蓋及混合方式加入礫石，重填於沖蝕觀測箱中，以人工模擬降雨試驗測定土壤流失量，並以 USLE 公式求取實驗之土壤沖蝕指數。同時將實驗結果、土壤沖蝕指數線解圖法及幾何平均粒徑法三種方式求取之土壤沖蝕指數進行比較。土壤中的礫石，改變了土壤的物理性質，其中又以降低其孔隙度，間接影響其飽和水力傳導度降低土壤水分移動的速率，因而礫石的存在對於土壤沖蝕指數具有極高的影響，本研究中又以紅壤受礫石影響程度較大，黃壤之影響程度較小。以線解圖法與幾何平均粒徑法推估混合及敷蓋礫石土樣之土壤沖蝕指數，均得到低估之結果。而土壤表面礫石，減少了土壤滲透之面積，減緩土壤水分之滲透，增加了逕流量。當土表之礫石量，對於土壤的保護效力，超過其增加逕流量帶來之沖蝕力時，始確實對土壤保護有正面之效益。在本研究中，當礫石敷蓋率低於 15% 時，無法對土壤表面產生保護作用，而不能有效的減少土壤流失。

關鍵詞：土壤沖蝕指數、礫石、黃壤、紅壤。

A Study of the Effect of Mulch and Mix Gravel on Soil Erosion

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ABSTRACT Soil erosion is serious in Taiwan because of high rainfall. The fine soil particles erode easily and gradually increase the gravel content in soil after soil erosion occurs. This will change the structure of the soil and affect soil erodibility. Two sieved soil samples with gravel content in the soil and mulch on the soil surface were packed to measure soil erosion and soil erodibility factor with a rainfall simulator and the USLE equation. The measured erodibility factors (K-values) were compared with the K-values calculated by the K-nomograph, and geometric mean particle diameter. The results pointed out soil porosity and saturated hydraulic conductivity decreased with increasing gravel content. On the contrary, the K-values increased with increasing gravel content. The measured soil erodibility factor was slightly higher than the predicted K values using the K-nomograph, and geometric

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mean particle diameter. Soil infiltration velocity and depth decreased with gravel mulching and resulted in runoff increase. However, when the mulching rate was lower than 15%, gravel mulching would not protect the soil surface and didn't reduce soil loss.

Key Words: soil erodibility factor, gravel, red soil, yellow soil.