VERIFICATION EXPERIMENT ON EFFECT OF LITTER LAYERS ON WATER STORAGE

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It is predictable that global warming exerts large influence on the dependence for water resource. In addition, it is predictable that the demand for water is expanded by the development of social infrastructure. Therefore, it is necessary to stable supply of water resource. Artificial dam has been constructed on water resource measures to the present time. However, the improvement of artificial dam is expected on environmental side and an economic side. The forest is paid to attention by measures of small environmental burdens. The forest is regarded by high function on water storage with the forested soil except existence of the tree. The forested soil is composed of litters. The forested soil is qualitative for effect on water storage, and it is not reflected by measure planning of water resource. Various studies have been conducted on effect of the forested soil on water storage. Kosugi (1999) led the rainfall storage index, and made the index that was able to reflect in analytical model. Putuhena (1996) led the amount of water storage potential. However, these result is instance on targeting for specific area. In this case, it is not comparable with litter kind and slope condition. Therefore, application to the extensive area is difficult. The experiment is effective in the comparison of states. The same condition can be kept only by changing of litters coating. The experiment model is reflected easily in the analysis. Therefore, there is an advantage of easily leading quantitative effect. Hydraulic conductivity is a parameter that is expressible of water storage function, and reflected easily in an analytical model.

In the experiment, geomorphic condition and rainfall were modeled. Geomorphic condition indicates coating litters and soil. The effect on water storage is understood by discharge from experimental system. The rainfall was given by precedence for 10 minutes, and the discharge of one hour was measured. The experimental system is able to change angle because fulcrum is mobile type. Litters sample used main 3 kinds (broadleaf, acicular, laurel) of tree in Japan. Litters immediately after the fall was used for the experiment. Characteristic of the litters on water storage was understood by the experiment result. In case of broadleaf and laurel coat, the peak of discharge decreases greatly. In case of acicular coat, the peak of discharge gets delayed. Decrease and delay of discharge peak indicate the effect of litters on water storage. Figure 1 indicates hydrograph of experiment. Moreover, it turned out that the effect of water storage became small in a higher angle from adjustment of the experimental system.

The infiltration analysis duplicates the experiment result. The analysis used 2dimension unsaturated model base on Richards equation with soil hysteresis. The stratum is made by

2layer model of the litter layer and the soil layer. The litter layer is indicated by to give anisotropy to hydraulic conductivity with soil layer. An analytical result of changing hydraulic conductivity was compared with the experiment result, and it led hydraulic conductivity of optimal value. We made comparative study by the total discharge and the hydrograph to use the standardization score equation. The correlation coefficient in the hydrograph of an experiment result and an analytical result exceeds 0.9. This result indicates the domination of hysteresis introduction. The anisotropy of hydraulic conductivity in vertical direction becomes 1/2 as common result to each litters layer. It is evaluated that the effect of water storage is large because the litters layer on hydraulic conductivity is smaller than the soil layer.

The effect of litters on water storage was quantified by this research. Moreover, the experiment clarified the characteristic of effect on water storage and the relation to slope angle.

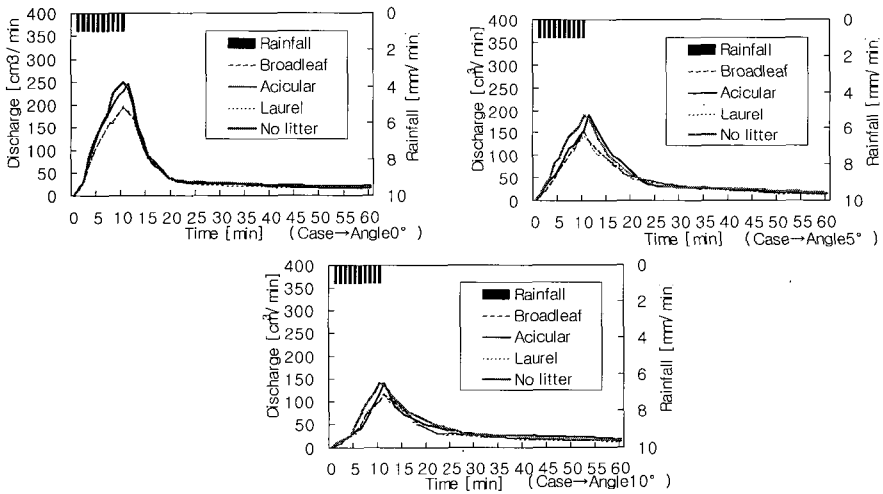

Fig. 1 The discharge from the experimental system of each coating case was made a hydrograph

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