III-A 279 Field Determination of Seasonal Evapotranspiration

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1. INTRODUCTION

Accurate determination of seasonal evapotranspiration from ground surface is very important to analyze precisely the flow in the unsaturated zone near the surface and also it is important for detailed analysis of moisture movement and pollutant migration near the ground surface. Field measurements were taken to determine the evaptranspiration from an actual grass field during all seasons in the year and also, to study the effect of radiation on the evapotranspiration all over the year.

2. MEASURING APPARATUS.

Box type technique has been used for measuring evaporation or evapotranspiration from ground surface (Abdel-Lah et al. 1995). A small part of ground surface is covered by a transparent box. Air is continuously injected into the box from one side and exhausted from the opposite side through two pipes attached on each side wall. The evapotranspiration from ground surface was determined by measuring the temperature and relative humidity of in- and outgoing air flow passing through this room.

3. EFFECT OF RADIATION ON EVAPOTRANSPIRATION DURING THE YEAR.

Four field measurements were taken to study the effect of radiation on evapotranspiration during the year at Saitama University Campus.

Evapotranspiration was measured at two different places; the first with a full cover of grass (Vegetation) and the second place with very little grass with grass root layer. The measurements were taken at the same time in each experiment and air flow discharge was fixed at 230 liter/minute. First experiment was taken in winter season on February 2, 1995, second experiment was taken in spring season on May 24, 1995, third experiment was taken in summer season on August 25, 1995 and the fourth experiment was taken in autumn season on November, 1995. Figures 1, 2, 3 and 4 show relationships between evapotranspiration for full cover of grass field and little grass field with measured net- radiation in winter, spring, summer and autumn, 1995 respectively .

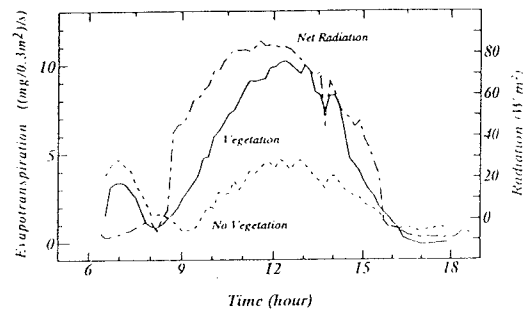

Figure 1. Relationship between the evapotranspiration for vegetated and non vegetated place with measured net radiation in winter season.

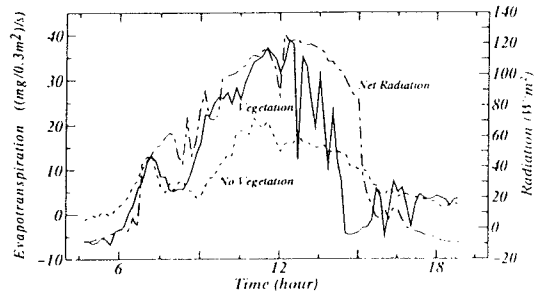

Figure 2. Relationship between the evapotranspiration for vegetated and non vegetated place with measured net radiation in spring season.

From these figures evapotranspiration generally increases with increase of net-radiation and these figures also, show that evapotranspiration rate changed with same trend of net- radiation. The maximum evapotranspiration from full cover of grass place in summer season is about four times of that from same place in winter season. Also, evapotranspiration is lager from full cover of grass place than that of little grass place in all seasons and evapotranspiration from the first place is about three times of that from the second place in winter season. Figure 5 shows relationship between evapotranspiration with radiation at the vegetated place in the winter season, this figure shows that the evapotranspiration increases with the increase of the radiation. Also, at the same radiation, the evapotranspiration in the afternoon period is larger than that in the morning period due to the temperature and absolute humidity difference between morning and afternoon.

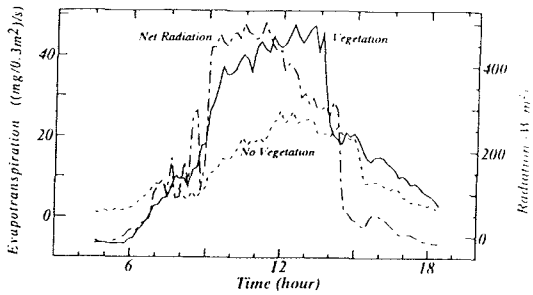

Figure 3. Relationship between the evapotranspiration for vegetated and non vegetated place with measured net radiation in summer season.

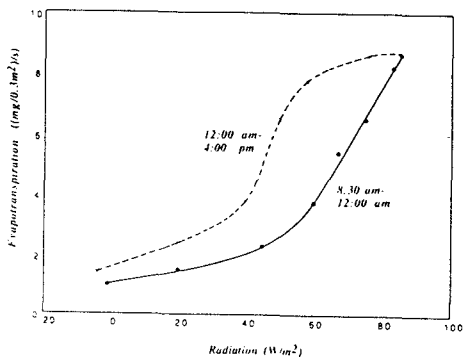

Figure 5. Relationship between the evapotranspiration for vegetated place with measured net radiation in winter season.

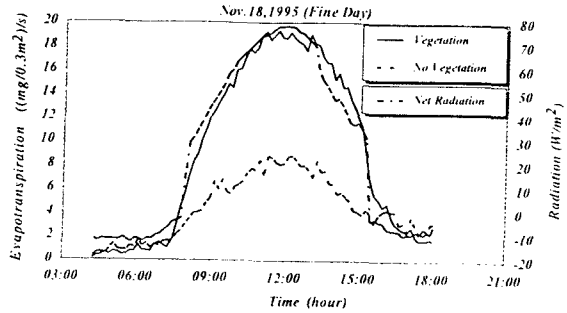

Figure 4. Relationship between the evapotranspiration for vegetated and non vegetated place with measured net radiation in autumn season.

CONCLUSIONS:

1. Box type technique was successfully used to measure evapotranspiration from ground surface in all seasons during the year.
2. The evapotranspiration is generally affected by the net- radiation and the evapotranspiration is larger in summer season than that from any other season.
3. The evapotranspiration from full cover of grass place is always larger than that of little grass with grass root layer in diurnal time in the day.

REFERENCES:

1- Abdel-lah, A. K., Watanabe, K. and Kurokawa, U., In situ and laboratory tests for measuring evaporation from ground surface, Al-azhar Eng.Fourth International Conference, Cairo, 1995.
2- Abdel-lah, A. K., Watanabe, K. and Kurokawa, U., Simple determination of evaporation using a new technique, Proc. of The 50th National Conference of Japan Society of Civil Eng., Matsuyama, 1995.