WATER DISTRIBUTION IN SOME SOILS FROM CLASSICAL AND TUNNEL-TYPE SOLARIUMS, IRRIGATED BY DRIPPING

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Drip irrigation consists in the slow administration of water in the area of plant root system, for satisfying plant physiological demands and is seen as a variant of localized watering method. Although the watering method by dripping is relatively new in Romania, at the beginning, it was used in vine plantations, but once with the extension of areas occupied with solariums, this watering method was adopted almost exclusively because of the many advantages it has.

As a result of applying water by dripping, a wet area was formed in the next proximity of dripper that may have different shapes according to soil characteristics and dimensional elements of the watering equipment.

According to the used watering technique and equipment, soil wetting has the shape of some strips with different lengths and depths and variable values of water content from soil on the areas of solarium (centre, ends). In the classical-type solarium, soil moisture is influenced by water infiltrated from outside that resulted from rainfalls.

***Key words**: drip irrigation, soil moisture, solariums*

As a renewable, vulnerable and limited natural resource, water is an essential element for society, being a determining factor in maintaining the ecological balance for living and for all human activities.

The drip irrigation technology consists in water supply directly to the plant root or in the area of root at the same time with the application of fertilizers and/or chemical substances. Water is spread uniformly and slowly, drip by drip, at a proportion and frequency adapted to plant needs, with the possibility of strict compensation of evapotranspiration. The drip irrigation can be applied on almost every soil type and sloping lands.

Because of slow capillary movement of water in soil, there is no air out from soil, due to water penetration. Usually, soil micropores are dry and aired, the moisture level being a little over the soil capacity, except a saturated relatively small area, found next to the dripper. This allows soil a corresponding respiration of plant roots on the entire vegetation.

MATERIAL AND METHOD

The field observations on water distribution in soils from greenhouses and solariums were done within a classical-type solarium and a tunnel-type solarium, situated in the locality of Dumbrava, Neamţ County. The area of classical solarium is of 525 m^2, respectively, 400 m^2 at the tunnel-type solarium, having the length of 10 m and being placed on a cambic phaeozem, with the following horizon succession: Ap-Atp-Am-Bv_1-Bv_2-BCk-Cca.

As concerns the determination of water content from soil, we have taken soil samples from 10 cm until the depth of 50 cm, eight days after applying drip irrigation and 24 hours after recording 15 mm rainfall.

Checking points were placed in the middle of solarium, at its extremity and at the exterior, at the distance of 20 cm.

In the interior space of solarium, soil samples were taken both from plant rows and from the interval between rows. For determining the field height in the area of solariums, they carried out topographic measurements of precise geometrical levelment, by the method of radiation and traversing combined to radiations. Levelment observations were done by means of precision Zeiss Ni-030 levelling indicator and surveying rods, the level differences being determined according to the two horizons of the level instrument.

RESULTS AND DISCUSSIONS

In tunnel-type solarium, the values of water content from soil (fig. 1), determined on plant rows and on the intervals between them, have shown a relative uniformity of soil moisture on the entire solarium area, comprised between 20.89-22.37%. We found insignificantly lower water content from soil on plant rows, compared to the content recorded on the interval between rows and a content diminution from middle to extremity of solarium.

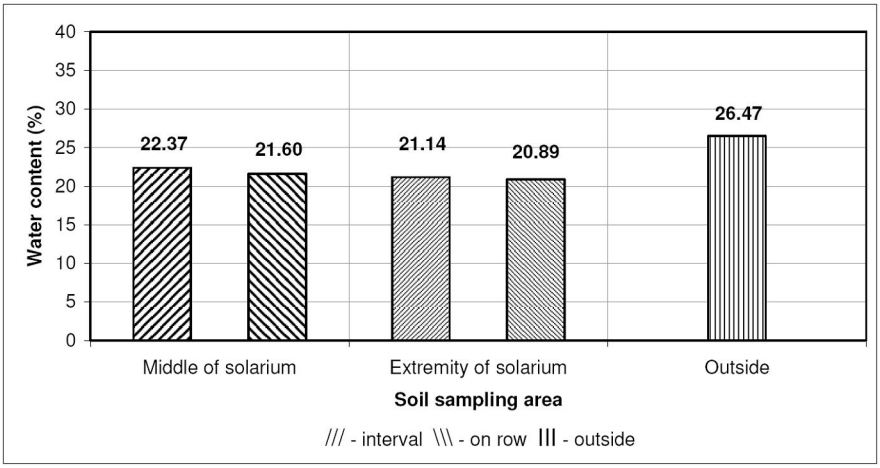

Figure 1 **Water distribution on areas, in soil from the tunnel-type solarium**

Due to foil burial at 70 cm depth in the tunnel-type solarium, water resulted from rainfalls had no influence on soil moisture from solarium by infiltration.

The uniformity of soil moisture in the tunnel-type solarium is also reflected in the development of plants, which are at the same vegetation stage on the entire area of solarium (*Picture 1*).

Figure 1 **Crop stage in the tunnel-type solarium**

The values of water content from the classical solarium (*fig. 2*), determined 24 hours after recording 15 mm rainfall, emphasized the influence of water resulted from rainfall on soil moisture in solarium. Water content from soil at the extremity of solarium was by 8, respectively, 15 percents higher on crop rows and on the interval between rows.

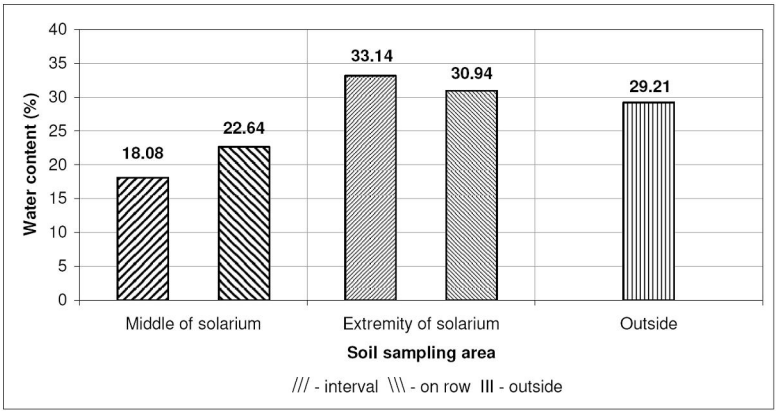

Figure 2 **Water distribution on areas, in soil from the classical solarium**

Figure 2 shows that soil moisture at the extremity of solarium was higher than at the exterior with 3 percents. This was caused by water infiltration and runoff at land surface towards the interior of solarium, as it is shown in the transversal profile made through the classical-type solarium (*fig. 3*).

Figure 3 shows that next the classical-type solarium, the height of field was higher by 14 cm, compared to the field area of the solarium. This makes that rainfall and, especially, water resulting from the top of solarium flows at soil surface from exterior to interior of the solarium.

Applying water by dripping at the same time with water runoff and infiltration from exterior in the classical-type solarium may cause moisture excess in the extremity area of solarium after abundant rainfall periods.

Due to water excess produced at the extremity of solarium, plant growing conditions became worse, while in the interior of solarium, plants are found at different development stages *(Picture 2*).

Picture 2 **Crop stage in the classical-type solarium**

Figure 4 shows that soil moisture in the middle area of the two solariums is relatively equal, great differences being recorded at the extremity of solarium. At the date of soil sampling, the differences were of 11 percents, according to rainfall amount.

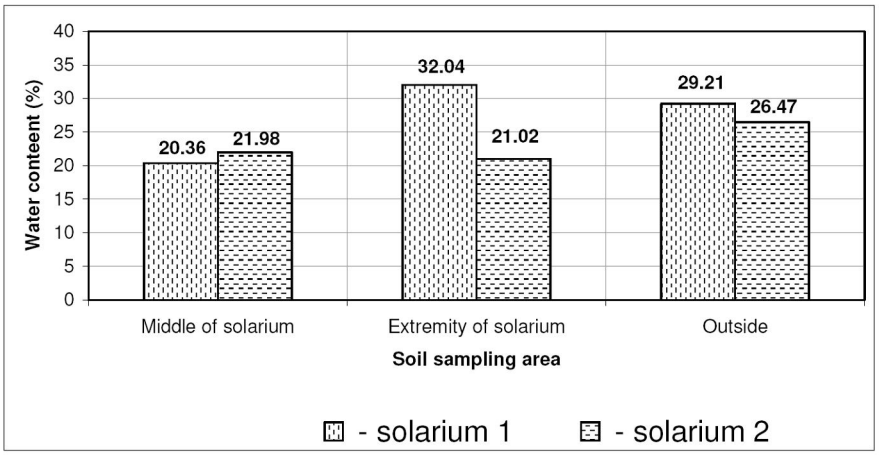

Figure 4 **Mean water content from soil on zones, in the classical and tunnel-type solariums**

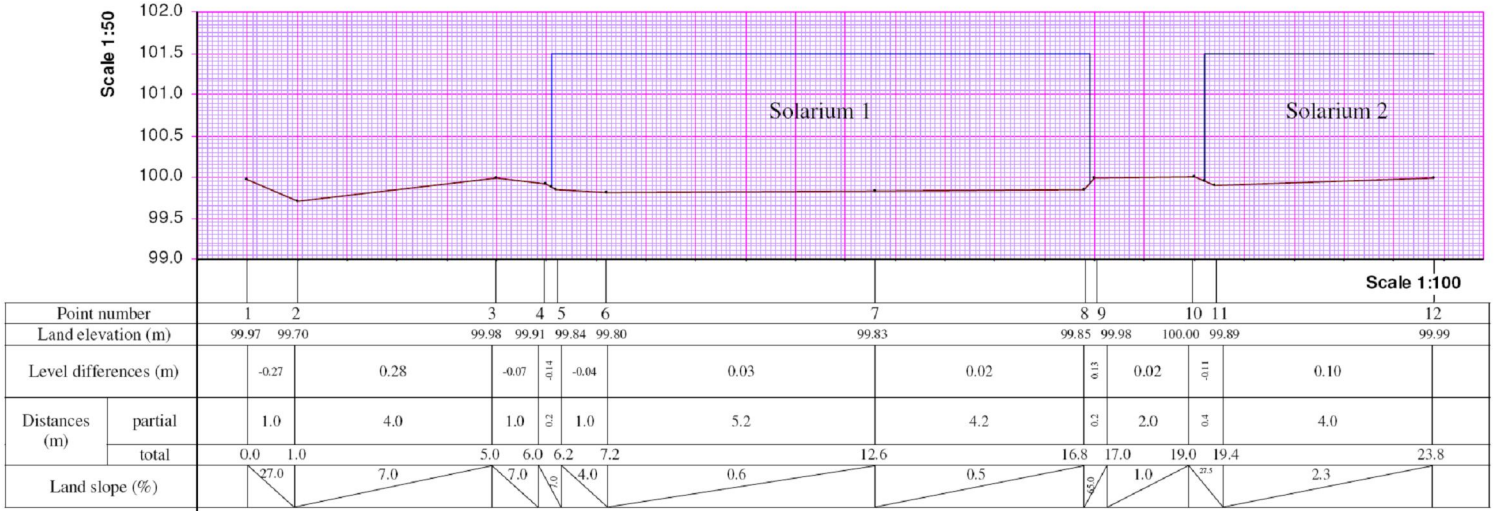

Figure 3 **Transversal profile through the classical-type solarium**

The influence of water from rainfall on soil moisture, in the extremity of solarium, is shown in *Figure 5*, a correlation being found between the values of water content from soil, according to depths at the extremity area and the values recorded next the solarium.

For avoiding the formation of water excess at the extremity of classical-type solariums, during the periods with abundant rainfall, we recommend the achievement of ditches that collect and evacuate water runoff from the top of solarium.

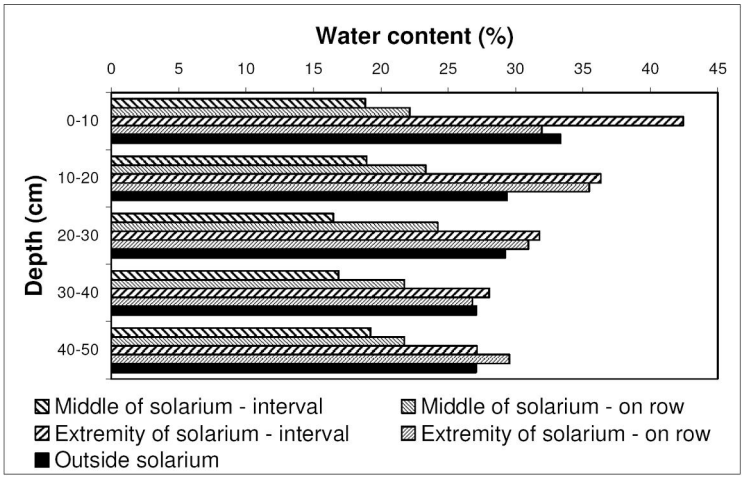

Figure 5 **Water content from soil according to depths and zones in the classical-type solarium**

CONCLUSIONS

1. Foil burial at the depth of 70 cm in the tunnel-type solarium prevents the infiltration of water from rainfall, being assured a uniformity of water content from soil in the interior of solarium, determined by drip irrigation.

2. At the classical-type solarium, soil moisture increases from the middle to the extremity of solarium, being influenced by the water infiltrated from exterior, which resulted from rainfall.

3. For avoiding water excess in the extremity of the classical-type solarium after abundant rainfall, we recommend the achievement of ditches for taking over and evacuating rainfall water from the top of solarium.

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