

STUDY OF MOISTURE DISTRIBUTION IN DRIP-IRRIGATED CAMBIC CHERNOZEM IN THE CRACAU PLAIN

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Abstract

Drip irrigation allows plants to be watered by slowly wetting the soil on a small surrounding area using special devices that distribute water drop by drop. The main advantage of drip irrigation compared to classic irrigation methods is that the necessary water amount is considerably reduced by wetting the soil strictly in the area that contains the roots for the plant. This allows a rigorous dose of the distributed water amount. On a clay loam cambic chernozem in the Cracau Plain that has a present moisture content of 19% g/g, field capacity of 23.2 % g/g, wilting coefficient of 14.8% g/g and bulk density of 1.36 g/cm³ (mean values for a depth range of 0 - 80 cm), we performed water irrigation for a duration of 10 hours using spiral microtube dripping devices. The total water discharge per dripping unit ranged from 19.6 – 36.1 l, and the water flux ranged from 1.96 – 3.65 l/hour. Twenty-four hours after irrigation, we observed that the distribution of about 20 l of water, with a water flux of about 2 l/hours, provided soil wetting of the zone under the dripping device at higher values than the field capacity at a depth of 80 – 90 cm. The diameter of the wetting contour ranged from 60 – 100 cm at a depth from 40 – 50 cm, and the border diameter of the wetting zone ranged from 100 – 400 cm at a depth from 50 – 70 cm. Higher water flux values or longer irrigation durations resulted in a longer overwetting state in the upper half of the active layer of the soil and in water loss by percolation.

Key words: drippers, cambic chernozem, moisture content, wetting contour