

INFLUENCE OF IRRIGATION METHODS ON CORN'S PRODUCTIVITY

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Modern methods of irrigation are considered as a key factor in the intensification of technologies for growing of grain corn. The productivity of the crop as a result of the optimization of water and nutrient regimes increases from 100 to 380% in comparison with non-irrigated conditions.

The aim of the research was to study the effect of sprinkling, drip irrigation and subsurface drip irrigation on growth processes, the structure of the crop formation and the yield of grain corn.

Field experimental studies were conducted on the lands of Kamyans'ko-Dnieprovs'ka research station IWPLM of NAAS during 2018-2020 on chernozem ordinary medium loam.

Three methods of irrigation were studied: sprinkling (Hose Reel Irrigator IRTEK 43FBT /120), drip irrigation and subsurface drip irrigation with 0,25 m depth of the dripper line installation. Conditional control was the variant without irrigation. Moisture reserves were monitored using the iMetos ECO D2 digital soil moisture station.

On the basis of the conducted researches, it is confirmed that all methods of irrigation, in a complex with other agricultural practice are the key factor of intensification of growth processes and formation of the grain corn crops productivity under these conditions.

In particular, the obtained results confirm that the method of irrigation significantly affects the formation of basic biometric parameters, yield structure and productivity. It is established that the maximum parameters of growth processes (plant height, leaf surface area, as well as photosynthetic potential and net photosynthesis productivity) of corn are provided by drip irrigation. Significantly lower and similar values were determined for the conditions of subsurface drip irrigation and sprinkling, and the lowest parameters of corn productivity were obtained under natural moisture conditions.

It was found that the pre-harvest moisture of corn grain in all variants of the experiment was below the baseline (14%). At the conditional control (without irrigation) it was 9,6%, increasing with subsurface drip irrigation to 11,6%, with drip irrigation – 12,4% and sprinkling - up to 13,8%.

The highest yield of corn grain was obtained under drip irrigation – 20,69 t/ha, while under subsurface laying of irrigation pipelines it was significantly lower – 16,44 t/ha. In the variant with sprinkling, the decrease in grain yield by 0,62 t/ha compared to subsurface drip irrigation was within the least significant difference of the experiment ($LSD_{A0,5} = 1,93$), which indicates only the trends in the formation of this indicator. On the variant of conditional control (without irrigation), on average,

for three years, a low yield level was obtained - only 3,85 t/ha. These results clearly confirm the significant risks and inexpediency of this crop in the Steppe conditions without irrigation. The results also confirm the existence of a close correlation between corn yield and leaf surface area of plants. The obtained dependence is described by a linear equation of the form $y = 0,6227x - 14,133$, and the coefficient of determination is $R^2 = 0,98$.