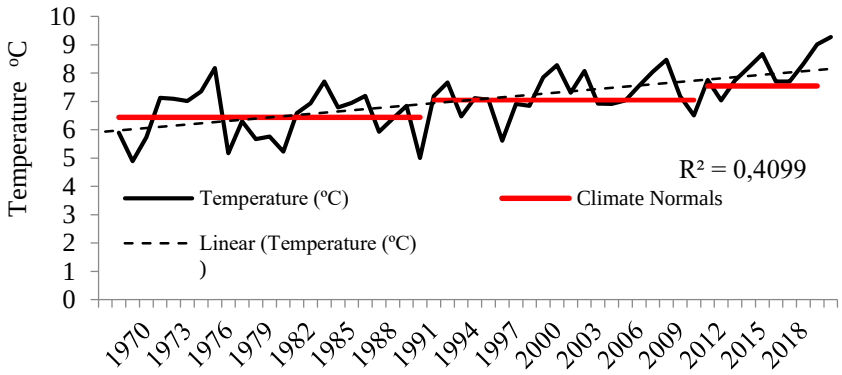
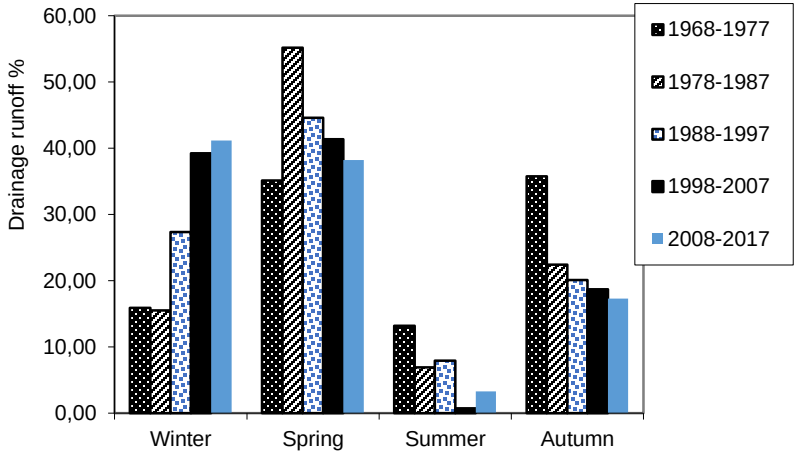
IMPACT OF CLIMATE CHANGE ON THE HYDROLOGICAL CHANGES OF SUBSURFACE DRAINAGE

Otilija MISECKAITE
Vytautas Magnus University Agriculture Academy, Lithuania

Climate change adversely affects the determinants of agriculture. Rainfall is a significant factor on pesticide leaching; pesticide leaching generally increases with increasing annual precipitation. Leaching is vertical downward displacement of substances through the soil profile and the unsaturated zone, finally reaching groundwater. The hydrological regime of subsurface drainage runoff has been changed due to climate change. Subsurface drainage is active also during the non-vegetation period, due to increase of temperature in cold seasons. Drainage runoff quantity increases during the cold season, as a result of which more nutrients are leached from the soil. The activity of subsurface drainage during various seasons and the impact of meteorological conditions on drainage runoff in different seasons (winter, spring, summer and autumn) has been reviewed over the last 50 years. The study is being performed in the Kaunas, a city located in a humid continental climate region in the Middle of Lithuania, a loam arable land. The analysis of subsurface drainage runoff observation data from 1968 to 2017 revealed that seasonality, typical for run-off change, remains, however, the drainage runoff during winter season has increased significantly over the past five decades. Mann - Kendall test for seasonal drainage runoff shows that drainage runoff has a statistically significant tendency to increase in winter seasons, and to decrease in spring seasons. It was also influenced by growth of multi-year temperatures. Better understanding of soil moisture and dynamics of groundwater, especially in tile-drained land, could help to reduce biogenus leaching from agriculture land.
(*)

Keywords climate change; subsurface drainage, water resources, environmental





CONCLUSIONS

The analysis of runoff observation data in 1968-2017 revealed that seasonality, typical for run-off change, remains, however, the drainage runoff during winter season has increased significantly over the last five decades. Drainage runoff in the winter season was on average about 28%, in the spring season about 43 %, in the autumn season about 23%, and in the summer season, the runoff was quite insignificant - about 6 % in 1968-2017 period. The largest change was observed in the winter season: drainage runoff increased from 12% (1968-1987) to 41% (2008-2017). Mann-Kendall test showed a significant increase of winter season subsurface drainage runoff during research period.