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Effects of climate changes on hydrological extremes in Crisul Alb River Basin

Rodica Paula Mic[1], **Ciprian Corbus**[1], **Aristita Busuioc**[2] and **Marius Matreata**[1]
[1]National Institute of Hydrology and Water Management, Romania
[2]National Administration of Meteorology, Romania

Deterministic mathematical rainfall-runoff model CONSUL was used for simulation of discharges on 42 river sub-basins, their routing and composition on the main river and tributaries and passing through the reservoirs, according to the schematic representation of how water flows and collects in Crisul Alb river basin. For each sub-basin, average values of precipitation and air temperature determined based on the measured values, with 6 hours time step, from meteorological stations, were the input data requirements of CONSUL model. For calibration of model parameters, corresponding to the hydrometric stations located in the closing sections of river sub-basins, a number of 25 rainfall-runoff events from the period 1975-2010, covering a wide range of floods formation, ware used. The parameters, thus determined, allow getting some generalization relationships, according to the river sub-basins characteristics, used to estimation of the parameters for the uncontrolled sub-basins or river reaches. Based on the projected precipitation and air temperature resulted from the outputs of a statistical downscaling model on high spatial resolution (1 km x 1 km), the calibrated model allows hydrographs simulation for the future period (2021-2050). In order to estimate the effects of climate change on the hydrological extremes in the Crisul Alb River Basin, the results from two simulations were comparatively analyzed. Changes at the level of monthly and annual extreme discharges as well as at the level of instantaneous extreme discharges with different probabilities of excedance, using theoretical curves of probability are emphasized.

rodica.mic@hidro.ro

Application of nitrogen as spikelet fertilizer reduces the deterioration of rice quality under elevated temperature during grain filling stage

She Tang and **Yanfeng Ding**
Nanjing Agricultural University, China

Global surface mean temperature is supposed to increase by 1.4-5.8°C by the end of 21st century according to IPCC 2014. Temperature rise would bring a deterioration of rice quality especially to chalk characteristic. In order to better cope with the challenges of global warming, effects of nitrogen spikelet fertilizer on rice quality under elevated temperature during grain filling stage were investigated. FATE facility was used to increase the rice canopy during grain filling stage and different growth regimes including CK (no warming with any nitrogen spikelet fertilizer application), ET (elevated temperature with no nitrogen spikelet fertilizer application), ET+N (elevated temperature with nitrogen spikelet fertilizer application), CK+N (no warming with nitrogen spikelet fertilizer application) were conducted. Results showed that elevated temperature decreased the performance quality and cooking quality, while nutritional quality and eating quality were relatively increased. Grain filling rate and amyloplast development for both superior and inferior grains were obviously accelerated during early grain filling stage by elevated temperature and application of nitrogen spikelet fertilizer sufficiently inhibited the deterioration of rice quality particularly for chalk performance without decreasing the grain weight. The above evidence indicates the application of nitrogen spikelet fertilizer is a proper method in mitigating the quality deterioration under global warming.

tangshe@njau.edu.cn