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The use of seasonal forecasts in agrometeorology: Smederevska Palanka 2012 case study

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Continued pressure on agricultural land, food insecurity and required adaptation to climate change have made modelling of future agro-ecosystems development highly important. Various modelling tools are used for decision making and planning in agriculture. An important component in this is crop modelling. Dynamic crop models simulate processes which are important for plant growth and development, taking into account the impact of meteorological conditions and agricultural practices on these processes. These models usually aim to predict crop yields in the wider area. One of the dynamic models of crop production is CROPSYST model.
In this study we have analysed results of the CROPSYST model simulations for location of Smederevska Palanka and year 2012, for maize hybrid ZP704 (FAO700). The year 2012 was characterized by very cold winter and very high air and soil temperatures with little precipitation amount and low soil moisture during summer. Unfavourable agro-meteorological conditions led to a decrease in yields of more than 40%. CROPSYST model simulations were carried out on the basis of observed meteorological data and ensemble seasonal forecast produced by regional climate model RCM-SEEVCCC. Observed data were used from the main meteorological station Smederevska Palanka. In addition to high quality and continuity of temperature and precipitation observations, this station possesses soil moisture measurements as well. In RHMSS seasonal forecast (7 months ahead) is issued every month for Euro-Mediterranean region by applying regional fully-coupled atmosphere-ocean climate model RCM-SEEVCCC. CROPSYST model simulations were performed for each member of the ensemble as well as for the mean value of the 11-member ensemble forecast.
There is a difference in date of phenophases between CROPSYST model simulations with forecasts and with observations, up to 10 days. This is probably due to higher temperatures and larger amount and more uniform distribution of the precipitation during the growing season obtained by forecasts. In addition to this, higher simulated soil moisture led to more maize biomass and higher yields.