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Climate change risks in agricultural plant production of Serbia

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Over the last two decades, Serbian agriculture has suffered increased losses and damages due to the more frequent occurrence of the extreme weather events caused by the climate change. The most significant losses are recorded in years with droughts and high summer temperature (such as 2012 and 2017). Significant losses in orchards are caused by the frost in late winter or early spring, when the flowering occurs early, due to a prolonged period of unusually high temperatures. On the other hand, damages caused by low winter temperatures are decreasing.

In order to assess the risk levels brought by the climate change and extreme weather events to the agricultural plant production in different regions of the country, analyzed are frequency of the occurrence of the weather events that may have significant negative effect to the yields of the most important crops (corn, maize, sunflower, soybeans) and fruits (plum, peach, raspberry, apple, wine grape), as well as pastures and meadows. Vulnerability is assessed through the analysis of agricultural production structure in the administrative districts of Serbia.

Weather events with potentially negative effect to yields and most vulnerable phenophases are defined for each crop or fruit considered in the analysis. For each plant and each potentially dangerous weather event one or more bioclimatic indices were adopted and calculated for the past, present and future. For the present (2000-2019), daily data on temperature and precipitation were used from the eOBS gridded observations dataset. Results of 8 regional climate models from the EURO-CORDEX initiative were combined into an ensemble. The ensemble was constructed upon the evaluation of their ability to simulate past climate characteristics over the country. The chosen simulations are done under the RCP8.5 IPCC greenhouse gasses emission scenario, for the periods 1986-2005, 2021-2040, 2041-2060 and 2081-2100.

Results showed that projected frequencies of the events such are water deficit and/or droughts and high temperatures in the critical phenophases of the considered plants, and late spring frost, are increasing in the future. The median value of the frequency of those weather events projected for the next 20 years is mostly already reached. Therefore, more weight is given to the 75th percentile of the ensemble projections for the increasing risks and the 25th percentile for the decreasing risks, as upper and lower limits of the most probable range of the future climate changes.

This assessment is used for drafting the National Climate Change Adaptation Plan in order to

propose and prioritize adaptation measures for the agricultural sector in the Republic of Serbia, on the national and administrative districts level.

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