



Decisional Tool Based on the Pedagogical, Climatological and Phenological Indicators Obtained from Satellite and Observational Data for the Efficient Management of Irrigations in Main Agricultural Areas from Romania

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This paper describes a decision-making tool to tackle the effects of the drought through the efficient management of water resources for irrigation. The decision tool is based on vegetation status indicators from MODIS satellite data and pedo-climatic indicators for soil moisture. The applicability of this decision-making tool is studied for five main agricultural areas in Romania (Dobrogea Plateau, Moldavia Plain, Romanian Plain, Transylvania Plateau and Western Plain), in the period 2000-2016.

The data used refer to vegetation status indicators (Normalized Difference Vegetation Index - NDVI indicator vegetation photosynthetically active fraction - fAPAR, Leaf Vegetation Index - LAI and Enhanced Vegetation Index - EVI) that are extracted by using the working package MODISrsp for the R software. The pedoclimatic drought indicators (Palmer drought Severity Index - and Standardized precipitation Index SPOW - SPI) are calculated using specific working packages in R from the climatological data on air temperature and rainfall provided by ECAD and from data on soil moisture content for stations in the five study areas. The data selected for analysis consisted of monthly averages of indicators during the vegetation season.

The working methods used consisted in applying correlation tests on vegetation and soil moisture indicators, checking the statistical validity of the relations and applying statistical tests such as "p", "chi2" and "Fischer". In order to achieve the decision-making tool, the intervention thresholds have been set depending on the state of vegetation and soil moisture.

The results of the study indicate the spatio-temporal evolution of the analyzed indicators during 2000-2016, identifying the links between the pedo-climatic drought phenomenon and the vegetation indicators. The usefulness of these relationships results from the capacity to provide information on the state of vegetation and soil moisture in agricultural areas lacking of climatological data and to provide a decision-making tool for the application of measures to combat the effects of the drought. Thus, the users of this tool will be able to complete the soil moisture deficit in a timely manner.