



## **EMRA: A tool for agricultural Extreme weather Monitoring and Risk Assessment**

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Climate change alters the occurrence and the effects of extreme events. The agricultural sector is affected by a higher exposure of orchards to late frost due to the earlier start of the phenological development or by increased periods of drought stress of crops due to intensified droughts. Merging expert knowledge from meteorologists, agricultural scientist and farmers the joint project EMRA, Extreme weather Monitoring and Risk Assessment, which is funded by the Federal Ministry of Food and Agriculture, establishes an interactive decision support tool for farmers and agricultural advisors. The resulting website and app will help to increase users' resilience to extreme weather. In contrast to common weather forecast tools, EMRA identifies relevant crop specific extreme weather events, warns users and offers crop specific advice. EMRA builds up on a previous project, which investigated a comprehensive number of field crops and derived crop specific thresholds for relevant extreme weather events. To run EMRA, data of the relevant meteorological parameters such as precipitation, temperature, wind speed, etc. are calculated on a nation-wide grid and provided by the German Meteorological Service (DWD), including climate data, weather forecasts and climate projections for Germany. Hence, applying EMRA users receive information about past, present and future extreme weather events for the study site and the cultivated crop. EMRA is in a first step developed for two case study regions and crops, including winter wheat in north-eastern Germany (Uckermark) and apple orchards in northern Germany (Altes Land). A recent EMRA-survey confirmed the interest of orchardists in obtaining information about late frost events. As an indicator for late frost both the leaf and the humid temperature are calculated by the DWD. For the assessment of drought risks of winter wheat, soil moisture is simulated by the DWD using the soil information of the Federal Institute for Geosciences and Natural Resources (BGR) in Germany. We established a close collaboration with farmers in the study areas to use field observations and feedback to continuously validate and improve the implemented models and features of the EMRA tool. In the long-term, EMRA is designated to be extended to further crops and regions. We introduce the project EMRA with special regards to late frost in northern Germany and drought risks in north-eastern Germany.