Relevance of extreme weather events to specialty crops

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Extreme weather events and their enormous potential to cause yield and quality losses in agricultural and horticultural crops are well known and deeply dreaded. However, detailed investigations and descriptive data are currently sparsely or even not available. The joint project „Agrarrelevante Extremwetterlagen“ aims to investigate if and how the relevance of extreme weather events will increase or if new extremes will occur in the course of climate change. The sub-project on specialty crops generates findings for wine, vegetable (asparagus, onion, carrot and cabbage), fruit (apple) and hop production using literature research, expert interviews and data analyses.

Experts (advisors and farmers) scored the severity of extreme weather events during the year with 0 (minor), 1 (medium) and 2 (high) and drew up a ranking within the extremes. The scores were used to calculate severity marks. The gained results were matched with findings from literature research on consequences, injury thresholds and currently available management methods. Additional exemplary data analyses serve to quantify damage potential. Injury thresholds are used to request the future likelihood of the relevant extreme weather events and to derive regional impacts.

In grapes hail, late frost and winter frost are classified to be most relevant. The investigated vegetables are mostly threatened by dryness, waterlogging and hail. Apple producers in Northern Germany (Altes Land) are afraid of hail, late frost and waterlogging, while the experts in Southern Germany (Lake Constance) ranked hail, dryness and late frost for apple production. Hop in nearby production area “Hallertau” in Southern Germany is mostly affected by drought and heat, hail and dryness. First analyses of yield data confirm statements from literature and expert interviews that extreme weather events are able to cause enormous damages up to total loss. For instance due to a late frost event in May 2011, yield in frost sensitive vineyards in the cropping area “Pfalz” was reduced by 27 to 44% compared to years without frost after budding.

The present study illustrates exemplary relationships and confirms that the intensity of impacts of extreme weather events strongly depends on species, varieties and site. Consequently, functional management strategies have to be developed applying a situation-related approach.