



## Continuous monitoring of seasonal phenological development by BBCH code

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Phenology, the science of recurrent seasonal natural events, is a proxy for changes in ecosystems due to recent global climate change. Phenological studies mostly deal with data considering the beginning of different development stages e.g. budburst or the beginning of flowering. Just few studies focus on the end of phenological stages, such as the end of flowering or seed dispersal. Information about the entire development cycle of plants, including data of the end of stages, are received by observing plants according to the extended BBCH-scale (MEIER 1997). The scale is a standardized growth stage key which allows a less labor intensive, weekly observation rhythm. Every week frequencies of all occurring phenological stages are noted. These frequencies then constitute the basis to interpolate the development of each phenological stage, even though it was not being seen during field work.

Due to the lack of studies using this kind of key for observations over the entire development cycle there is no common methodology to analyze the data. So our objective was to find a method of analysis, with which onset dates as well as endpoints of each development stage could be defined. Three different methods of analysis were compared. Results show that there is no significant difference in onset dates of phenological stages between all methods tested. However, the method of pooled pre/post stage development seems to be most suitable for climate change studies, followed by the method of cumulative stage development and the method of weighted plant development.