



## **Spring phenology and risk of late frost – a probabilistic evaluation**

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Plant spring phenology has evolved to respond to seasonal variation of temperature. Bud break must occur early enough for the plant to take full advantage of days conducive to carbon fixation, but also late enough to limit the likelihood of damage from late frost events. The timing of spring leaf phenology is thus the result of a productivity-risk of damage trade off. But what level of risk is accepted by the plants? And can these accepted levels of risks be explained by plant functional types and climatic features (e.g., extent of temperature fluctuations and rate of spring temperature increase)? To answer these questions, data on bud break dates relative to tree species with a wide latitudinal range from the Pan European Phenology Database PEP725 are combined with meteorological data from the EObs dataset. Different measures of risk of late frost damage at the time of bud break are considered, based on available species-specific critical temperatures for lethal damage. Emerging patterns of these risk levels are explained, with reference to climatic and plant features. The obtained classification of species based on their acceptable risk of late frost damage is compared to those based on other aspects of plant strategies (early vs. late successional; fast vs. slow growing).