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Phenological modelling of trees in Alpine regions of north-western Italy

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The analysis of phenological development rates of spontaneous plants is an important element for the knowledge of ecosystem dynamics. In fact, phenology is the study of periodic plant and animal life cycle events and how they are influenced by environmental changes, especially seasonal variations in temperature and precipitation driven by weather and climate. This discipline is usefulness both at the descriptive level, in order to study the behavior of a species in different places of settlement, or to compare different species related to the climatic factors, which are the guiding variables of the whole process. The heterogeneity of habitats in northwestern Italy combined with the presence of large number of protected areas represent the best conditions for making continuous and constant observations in extremely different climatic and geomorphologic situations to better understand the reactions of forest ecosystems to climate change.
For these reasons, the Piedmont Region and the Protected Areas Sector, started in 2009 a monitoring activity on the phenological behavior of some spontaneous tree and shrub species (Corylus avellana, Fraxinus excelsior, Fagus sylvatica, Sambucus nigra, Betula pendula, Alnus glutinosa, Prunus avium, Sorbus aucuparia and Larix decidua). A primarily descriptive analysis has been conduct producing graphical information and an iconograpic database has been realized. Later, statistical elaborations to identify relationships between the phenological behaviors and the trend of the main local climatic variables has been gathered. Furthermore, a phenological model based on chilling temperature requirement, has been applied and climat model projections have been used to simulate species bud burst by the end of century.
The Phenological Network of Piedmont (PNP) is nowadays a reference point for studies on the phenological behavior of these species in different parts of the territory.