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Fifteen year phenological plant species and meteorological trends in central Italy

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The present study was carried out in a phenological garden located near Perugia, central Italy, which contains vegetative clones of plant species, common to several international phenological gardens such as: Cornus sanguinea L.; Corylus avellana L.; Ligustrum vulgare L.; Robinia pseudoacacia L.; Salix acutifolia Willd.; Sambucus nigra L. The vegetative plant growth monitoring was realized week by week using common international keys: V3) bud break and leaf unfolding; V5) young unfolded leaf; V7) adult leaves; V8) beginning of leaf colouring. The phenological dates thus obtained provide a model of development for the different species in relationship to the fifteen-year period of observation (1997-2011). By a meteorological point of view the principal temperature and rain trends were studied showing as the highest anomalies during the study period were those recorded during the first months of the year (January and February). The phenological data evidenced a double trend behaviour considering the two central phases (V5-V7) in comparison to the other ones (V3-V8). In general, a quite invariance in the manifestation of the open bud phase and a contemporary advance of the young open leaves phase particularly from 2006 was recorded, with a shortening of the leaf opening period probably due to more rapid spring temperature increase in the last years. The delay tendency of V7 phase in particular evidenced the presence of growing leaves till summer weeks monitoring young leaves for a long time On the contrary, the V8 (autumn leaf colouring) phase tend to remain constant, with the exception of some species such as Corylus and Cornus which showed variations of this phase, showing as the signal for leaf colouring in fall is quite ambiguous and less evident.
The lowest correlations between annual vegetative phases and temperature variations were manifested above all by two species (Sambucus nigra L. and Robinia pseudoacacia L.) for which the first leaf development phases appeared probably influenced by photoperiod.