



Phenological series in Bologna (Northern Italy): temporal trends and spatial pattern of greening

Giovanna Puppi (1) and Anna Letizia Zanotti (2)

(1) Bologna, BES, Bologna, Italy (giovanna.puppi@unibo.it), (2) Bologna, BES, Bologna, Italy (annaletizia.zanotti@unibo.it)

In Europe, in the last thirty years, the onset of spring has advanced (Estrella et al. 2009 *Clim Res.* 39). However the phenological shifts vary from one country to another and long time series are scanty in Southern Europe (Peñuelas et. al. 2002, *Glob. Change Biol.*; Črepinšek et Kajfež 2003, *Ann.Ser.Hist.Nat.*13): for this reason we analyzed the data on leafing of some woody species recorded during the last 3 decades (1977-2009) in the city of Bologna (Emilia-Romagna, Northern Italy) and in several hillside stations in the neighbourhood of the town. As BGS index, the average day of “first leaf unfolding” (GFI=V4, BBCH=11) of a group of common woody species was chosen: the BGS days were analysed in relation with time and temperature changes. The BGS happens on average at the end of March. The species observed display a negative trend along the period (about 2 days of advance per decade) and the BGS days show a significant correlation with the mean temperature of the period January-March (about 3 and a half days of earlier start per degree of increasing temperature). Since an increase in winter temperatures has been predicted in the Emilia-Romagna region in the next decades (Tomozeiu et al. 2007, *Theor. Appl. Climatol.* 90), the growing season in our region is probably going to extend. Phenological spatial patterns of the neighbourhood of the city are also analysed: greening generally starts on southfacing hills between 100 and 300 m asl.