



The impact of thermal regime upon the beginning of apple-tree (*Malus domestica* Borkh.) flowering in Lithuania

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Plant development depends upon various environmental factors (climate, geographical situation of the locality, soil type). Climate produces the strongest impact comparing with other environmental factors. Recently, due to climate warming, vegetation period of plants lengthens and phenophases of different plants start earlier. Changes in phenophases are of particular importance for agricultural plants because they pre-determine timely application of plant protection measures against diseases and pests. In Lithuania, phenological observations have been performed since 1959. In 1960-1970, the phenological network of Lithuania included more than 200 localities on the territory of the country. Presently, phenological observations are performed in 23 localities (density of a network 0.4/1000 km²). The phenological network of Lithuania comprises the territory at 54010' and 56020' North latitude and 21048' and 26033' East longitude. In the majority of the present phenological stations observations have been carried out for more than 30 years. The aim of this research is to determine the impact of thermal regime on the beginning of apple-trees flowering in Lithuania during the period of 1961-2006. The beginning of apple-trees flowering has been investigated in 20 localities where phenological investigations are being performed for more than 20 years (in 4 localities the period of observation - 20-30 years, in 9 localities - 30-40 years, in 7 localities - more than 40 years). The research shows that apple-trees in Lithuania start flowering on May 16 on an average ($S_x = \pm 3$ days). Statistical evaluation of the obtained data revealed that the impact of geographical situation of the locality was insignificant because the differences among the dates of the occurrence of this phenophase in different localities were nonessential. However, due to present cli-

mate warming, i.e. since 2001, apple-trees on the territory of Lithuania start flowering averagely 8 days earlier than in the period of 1961-1980. Weak correlation between the dates of the beginning of apple-trees flowering and mean daily temperatures of January and February was determined in many localities (correlation coefficient $r < 0,5$). Correlations of medium strength, i.e. $r = 0,5-0,7$ in January were revealed only in two localities situated in Southwestern (Veisėjai 54010'N and 23070'E) and Western (Silute 55035'N and 21048'E) parts of Lithuania. In February, correlations of medium strength were revealed already in 5 localities in Western and Northwestern parts of the country situated up to 188 km from the Baltic Sea. Starting with March, the impact of temperature on the beginning of apple-tree flowering was significantly stronger in all localities. Negative correlations between the dates of the beginning of apple-tree flowering and mean temperature of March ($r = -0,37-(-0,59)$) and April ($r = -0,48-(-0,80)$) were revealed. The obtained results are statistically significant at 99%. These investigations show that during the last decade apple-trees in Lithuania start flowering averagely 4-5 days earlier than the many year average. This should be considered while applying the system of plant protection measures, as the appearance of diseases and pests usually occurs before the apple-tree flowering. Earlier forecast of the date of the beginning of apple-tree flowering could help to avoid negative consequences.

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