

Temperatures, precipitation and humidity determine the “behavior” of diseases and pests

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Temperature, precipitation and humidity are fundamental factors for insects, and their deviations from normal values, the optimum and the vital zone in the habitats from the normal, significantly affect their phenology, vital activity, population density and damage. The causal agents of fungal diseases and some bacterial phytopathogens are most strongly influenced by precipitation and humidity.

The temperatures and precipitation during individual months and periods of 2017 differ significantly from those in 2015–2016 and 2000–2014. January and February were the coldest months, and March – the warmest. The average monthly minimum air temperature in January was minus 8.6°C, the absolute minimum – minus 17.6°C; in February – minus 2 and minus 15.8°C, and the average monthly maximum temperature was only 1.2°C and

7°C and for February respectively 9.3 and 23°C. The average daily air temperatures were also extremely low – minus 3.9°C in January and 3.2°C in March.

Physiological dormancy in most harmful insects ends by the second half of January – the beginning of February, and after this period they slowly reactivate and proceed to active vital activity. In 2017 physiological dormancy was replaced by physical dormancy, caused by extremely low temperatures during the second half of January and in February. This dormancy delayed the physiological development of insects compared to years with normal temperatures. On 27 January the temperature of the surface soil layer dropped to minus 19-21°C, on 1 February – to minus 16.6-18°C, and on 24 March – to minus 2.6°C. These temperatures caused freezing of insects overwintering in the surface soil layer and shallow in the soil. April 2017 was cool and caused freezing of flower parts and young fruit set of early apricot and peach cultivars. The spring of 2017 was dry – only 94.2 l/m² of precipitation fell, about 2 times less than the norm. The summer was hot and dry.

The severe drought that started at the beginning of the second ten-day period of May and continued until 26 September caused desiccation of young and fruit-bearing apple and plum trees planted on light soils and without irrigation.

The data on temperature, precipitation and air humidity provide grounds to conclude that 2017 was characterized by one of the coldest winters in the last 16 years, by cool April and May and by a hot and dry summer. During this period air humidity was low and during certain parts of the day dropped to 25-30%, significantly below the minimum requirements of insects. The temperature, precipitation and air humidity in 2017, which differed significantly from the norm, had an adverse effect on the physiological development, population density and harmful activity of the main pests of agricultural crops.

Pests

The low temperatures in January and February caused freezing of a large part of the overwintering stages of the southern green stink bug, the tomato leafminer moth and other invasive insects.

The negative air temperatures and those of the surface soil layer in January and February caused freezing of 70-85% of the pupae of the European grapevine moth (in Central Northern Europe temperatures dropped to minus 24-26°C).

The negative temperatures in November – December 2016 and January – February 2017 caused freezing of over 85-90% of the young nymphs of the California red scale. Up to 10% of the third-generation nymphs

successfully overwintered. The first and second generations in 2017 were at very low density and damage to the fruits was observed only in the second half of July – the beginning of August.

Diseases

Conditions for infection of grapevine by the causal agent of downy mildew occurred only during the third ten-day period of May, when 24.8 l/m² of precipitation fell. The services of the Regional Food Safety Directorates (RFSD) registered this period and correctly signalled for the application of plant protection products (PPP). Where this was not done, the flowering and still not finished flowering inflorescences were massively infected in commercial vineyards and in pergola-trained vines.

The conditions from May to the third ten-day period of September were unfavourable for the development of grey mould – a dry and hot summer, as well as the absence of damage from powdery mildew and European grapevine moth, which create conditions for infection. The products applied against downy mildew also had a protective effect against grey mould. Specific PPPs were not used until 26 September.

In 2017 the winter was the coldest in the last 16 years, and June and the summer months – the driest and hottest. This adversely affected the main pests of agricultural crops – freezing of overwintering stages (reduction of the population, delay of phenological development, reduction of fecundity, deterioration of conditions for infection by phytopathogens, reduction of harmful activity, etc.).

Temperatures, precipitation and humidity differ in individual years and for the same regions, which necessitates their annual monitoring and the assessment of their impact on the main pests.

You can read in detail about the impact of climatic factors on some dangerous pests of agricultural crops in the Plovdiv agro-ecological region in 2017 in issue 1/2018 of the journal "Plant Protection".