## BULGARIA

The 2018 level I crown condition survey was carried out on 160 permanent sample plots. The observation covered 2427 coniferous trees, representing the four main coniferous tree species – Silver fir (*Abies alba* Mill.), Black pine (*Pinus nigra* Arn.), Norway spruce (*Picea abies* (L.) Karst) and Scots pine (*Pinus sylvestris* L.) and 3169 deciduous trees, representing nine of the deciduous tree species in the country, incl. Common beech (*Fagus sylvatica* L.), Oriental beech (*Fagus orientalis* Lipsky), Turkey oak (*Quercus cerris* L.), Hungarian oak (*Quercus frainetto* Ten.), Sessile oak (*Quercus petraea* (Matt.) Liebl.), Northern red oak (*Quercus rubra* L.), European hornbeam (*Carpinus betulus* L.), Sweet chestnut (*Castanea sativa* Mill.) and Large-leaved linden (*Tilia platyphyllos* Scop.), or 5596 sample trees in total.

The results show that both deciduous and coniferous tree species maintained about the same health status compared to the previous year. The share of healthy (not defoliated) and slightly defoliated trees was 68.15%. The percentage of trees in classes 3 and 4 (severely defoliated and dead trees) was 6.73%, 1.73% higher than in 2017. The trend of deciduous tree species being in better condition compared with coniferous continued in 2018 - 78.23% of deciduous trees and 54.97% of coniferous showed defoliation of up to 25%. The percentage of the deciduous trees in the 4th defoliation class (dead trees) was 1.42%, compared to 4.24% of coniferous trees.

Regarding the two monitored coniferous tree species up to 60 years of age, better condition was determined in Black pine stands where 0.46% of the trees had class 4 (dead trees), compared to Scots pine stands where 11.49% of sample trees were assessed as dead. The worst condition of trees aged over 60 years was determined in the Norway spruce stands where the share of healthy (not defoliated and slightly affected by defoliation) sample trees significantly decreased to 77.81% (in 2017 the respective percentage was 91.5%). The share of severely defoliated and dead trees (in 3 and 4 defoliation classes) increased from 0.53% in 2017 to 4.44% in 2018.

In the Silver fir stands a deterioration in the sample trees condition was also observed. In 2018, the share of healthy (defoliation up to 25%) trees was 62.7%, 26% lower than in 2017 when 88.7% of the trees were healthy and slightly affected by defoliation. The share of Silver fir trees in classes 2 to 4 (moderately defoliated to dead trees) significantly increased from 11.3% in 2017 to 37.63% in 2018.

The Scots pine stands maintained the worst condition, where less than half of the sample trees (45.31%) were assessed as not and slightly defoliated.
As a whole, the percentage of non-defoliated and slightly defoliated coniferous trees decreased to 54.97% (8.03% lower than in 2017) at the expense of the share of severely defoliated and dead trees which increased from 6.5% in 2017 to 10.8% in 2018.
The observations of crown condition in the deciduous stands with trees up to 60 years old assessed the Oriental beech stand from the Strandzha mountain region as being in the best condition, where 100% of the trees were classified as healthy (not defoliated). The condition of Northern red oak (*Quercus rubra)* and Hungarian oak (*Quercus frainetto*) stands, where more than 90% of sample trees were classified as not or slightly defoliated (in 0 and 1 defoliation classes), was assessed as very good. Turkey oak (*Quercus cerris*) stands, where 38.75% of the trees were classified as damaged in classes 2 to 4 (moderately defoliated to dead trees), were assessed as in the worst condition. The share of damaged trees in Common beech (*Fagus sylvatica*) stands was 26.25%, slightly higher compared to 2017.

The best condition among the monitored deciduous tree species over 60 years old was observed in the Large-leaved linden stand, where 100% of the sample trees were assessed as healthy (defoliation class 0). In the Turkey oak stands, the trees assessed in a good condition were 81.4% and in the Common beech (*Fagus sylvatica*) stands they were 79.7%. The highest percentage of defoliation was determined in the Sweet chestnut (*Castanea sativa*) plot, where

100% of sample trees were assessed as damaged (in classes 2 to 4) and for European hornbeam trees (the share of damaged trees was 32.81%).

The presence of the root fungus (*Heterobasidion annosum*) was determined in the Scots pine and Black pine stands. Ubiquitous spread of black pine disease, caused by the fungal pathogen *Diplodia sapinea* (syn. *Sphaeropsisi sapinea*) was also determined. An increase in its intensity was observed in the Northern Black Sea region and Southwest Bulgaria.

In relation to biological factors which influence the Common beech stands, the presence of necroses, caused by *Nectria* spp. and less frequently by *Ascodichaena rugosa*, was determined. Attacks by *Orchestes fagi*, *Mikiola fagi* and *Hartigiola annulipes* were also recorded. Small damages, caused by geometer and tortrix moths (Geometridae and Tortricidae), were found in the monitored oak stands (*Quercus cerris*, *Q. frainetto*, *Q. petraea* and *Q. rubra*). Hypoxylon cancer (*Hypoxylon mediterraneum*) was determined in part of the pure Turkey oak stands.

Representatives of the affecting stress factors (leaf pathogens and insect defoliants) and secondary stressors (xylotrophic insects and facultative parasites) were found in the observed forest stands and plantations.
No mass attacks by insect pests and fungal diseases were detected at that stage. However, the occurrence of unfavourable climatic conditions for the tree species may cause sudden insect pest attacks and epiphytotics of dangerous fungal pathogens.

In 2018, illegal felling was determined in a small number of the observed sample plots. The negative impact of the snow breaks, windbreaks and windthrows, occurring in 2016 and 2017, was still visible. The fallen trees that remain on the ground could enhance the mass development of bark beetles.