

The effect of pre-treatments on the germination speed of common hornbeam (*Carpinus betulus* L.) seeds in the Eastern Black Sea Region, Turkey

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Abstract: The objective of the present study is to determine the germination speed of seeds of the common hornbeam (*Carpinus betulus* L.) naturally spread in Turkey according to different populations and pre-treatments. The germination speed indicates seed strength and the high-strength seed germinates faster than the low-strength seed. Common hornbeam is found in the Black Sea Region, which is the whole European-Siberian flora region in Turkey. It is also spread locally in Amanos Mountains. Mature trees can generally reach a height of 20-25 m and live for average of 150 years. The seed material used in the present study was obtained from 12 populations in different altitudes in the watersheds of Trabzon-Maçka, Trabzon-Çaykara, Rize-Çamlıhemşin and Giresun-Espiye. In order to represent the population and to minimize the likelihood of kinship during sampling, there was at least 150 m between the sample trees in the selection of trees within each population. The common hornbeam seeds have dormancy being seed coat and embryo. Therefore, seeds were subjected to 22 different pre-treatments in different doses and durations including cold stratification, gibberellic acid (GA₃), citric acid, sulfuric acid (H₂SO₄), seed tip cut, steep in hot water. In all treatments, filled seeds identified through floatation in 96% alcohol were used. As a result of the study, germination speeds in among populations and among pre-treatments of each population were determined. The highest germination speed among the populations was observed in Çamlıhemşin-1 population, followed by Çamlıhemşin-2, Maçka-2, Çaykara-1 and Espiye-1 populations. It was also determined that the germination speed of the populations decreased as the altitude increased in each watershed. Furthermore, the highest germination speed was generally observed in GA₃ pre-treatment in terms of germination speed between pre-treatments in each population. This is followed by seeds treated with sulfuric acid.

Keywords: Hornbeam, *Carpinus betulus*, Germination speed, Seed pre-treatment