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HORMESIS AS A THEORETICAL BASIS FOR RATIONAL AFFORESTATION OF THE REPUBLIC OF MOLDOVA WITH DIFFERENT OAK SPECIES

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Purpose. The selection of oak species for afforestation is a strategic issue under global warming. The resistance of perennial plants to thermal stress depends not only on functional processes but also on morphological characteristics that help avoid stress effects. We rapidly evaluated the resistance to heat shock (*HS*) applied at different temperatures to leaves of *Quercus robur* L., *Quercus petraea* (Matt.) Liebl., and *Quercus pubescens* Willd., collected in midsummer. Based on the responses of the leaves to *HS* applied at different temperatures, we determined the position and dynamics of the hormetic zone in the oak species studied.

Materials and methods. Under controlled artificial conditions, the control leaves maintained their viability throughout the experimental period. Leaves from the experimental treatments were subjected to *HS* by immersion in water at the specified temperatures for 5 minutes. PSII fluorescence was measured in the control and experimental leaves at the beginning of the experiment and subsequently every 24 hours for 7 days. The ratio between the fluorescence values of the experimental leaves and those of the corresponding control leaves was then calculated. Based on these data, temperature-response curves were constructed every 24 hours after *HS* application. This approach allowed us to determine the level of PSII inhibition at different stages after *HS* exposure and to assess the kinetics of PSII activity recovery following treatments applied at different temperatures.

Summarized results. At 24 hours after *HS* exposure, the temperatures causing a 50% decrease in relative PSII efficiency in the leaves of *Q. petraea* and *Q. pubescens* were 0.6 and 2.0°C lower, respectively, than that recorded for *Q. robur*. At 168 hours after *HS* exposure, the corresponding value for *Q. petraea* was 0.1°C

higher than that of *Q. robur*, whereas the value for *Q. pubescens* was 0.8°C lower. During the recovery period between 24 and 168 hours after *HS* exposure, repair of heat-induced damage increased the *HS* temperature required to cause a 50% reduction in relative PSII efficiency by 1.4°C in *Q. robur*, 2.1°C in *Q. petraea*, and 2.6°C in *Q. pubescens*.

Conclusions. The quantitative characteristics of oak species' leaf responses to HS are similar. If the resistance to *HS* of one genotype is greater than that of another, then the effective temperature of *HS* exposition for induction of the hormetic response will shift to the right compared to the genotype with lower HS resistance. In oak species, the dose that induces the hormetic response also depends on the influence of resistance factors through avoidance.

Keywords: *oak species, photosystem II, heat shock.*

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