Seed germination and seedling growth is a critical point in plant ontogenesis. The commencement of germination under given environmental conditions determines the chance of survival of the seedling. However, the point at which germination begins is dependent on environmental signals, mainly temperature and humidity (water activity of the substrate), determined by the climatic conditions. The seeds show different sensitivity to temperature and humidity, which can be observed by examining the germination rate under optimal, sub- and supra-optimal conditions. The range of sensitivity to environmental signals determines the seed germination strategy, e.g. a wide range of temperatures favorable for germination may be a factor that facilitates competition with other species, e.g. may facilitate the spread of invasive species. On the other hand, seeds with a narrower range of optimal temperatures may cease natural regeneration in a habitat affected by the effects of climate change (e.g. drought). At the same time, individual variability in the sensitivity of seeds to environmental conditions is observed. Which makes possible to separate a subpopulations: the seeds germinate earlier, later, or not at all, after exceeding the appropriate thresholds (in accordance with the normal distribution). Wide intraspecific variability in seeds may prove to be necessary for adaptation in an area affected by climate change, e.g. in warmer winters, seed subpopulations with shallower dormancy will be promoted. Germination in sub-optimal or supra-optimal conditions takes place under stressful conditions, therefore only seeds with an active antioxidant system at the cellular level can show greater resistance to those changes. The aims of the research is to determine the range of cardinal temperatures (minimum, optimal and maximum) and the germination moisture of seeds of different populations of Norway spruce (*Picea abies* (L.) H. Karst), and to investigate the potential sources of this variability. I plan to use the obtained data to model the conditions for natural regeneration in current and predicted climatic conditions in Europe. The obtained and processed results will form the basis for a wider analysis of the plasticity and adaptability of seeds of woody plants from various biotopes. I assume that the following hypotheses will be verified during the course of the experiment: the seeds of Norway spruce, depending on the genotype, show different sensitivity to climatic conditions (i); seeds germinating under non-optimal conditions have a more active antioxidant system (ii); the obtained data can be used to model seed germination in natural conditions (iii). In my research, I plan to use the seeds of Norway spruce, which, as a result of climate change, is dying in its current range, moving to the north and to higher mountain locations. Seeds will be collected from a different populations (3-5) to determine their variability. Seeds of spruce belong to the orthodox category, are non-dormant, relatively accessible and germinate relatively quickly, therefore they will provide a good model for the proposed experiments. The germination rate will be calculated on the basis of constant temperatures: 3 °, 10 °, 15 °, 20 °, 25 °, 35 ° C and cyclically variable 3 °/15 °, 3 °/25 °, 15 °/25 °, 20 °/30 C in a cycle of 12/12 hours (4 repetitions of 50 seeds) under laboratory conditions. In addition, the impact of water availability will be investigated using three water potentials: 0, -0.4, -0.8 and 1.2 MPa at a temperature of 20 °C. Based on the germination rate under given thermal and water conditions, it will be possible to determine the cardinal values of temperature and humidity. The obtained values will allow the modeling of germination in various climatic conditions, indicating the probability of obtaining a seedling and assess what is the adaptive potential of the species. The publicly available WorldClim database will be used to predict seed germination in the current climatic conditions of Poland and the foreseen future (scenarios RCP2.6 and RCP8.5 for 2020-2040, 2041-2060). It is also planned to investigate the correlation between the germination rate in sub- and supra-optimal water-temperature conditions and the biochemical response of germinating seeds. Seeds (3-5 pieces x 5 replicates of each origin) germinating in 3 different hydro-thermal conditions (suboptimal, optimal and supra-optimal obtained on the basis of the first part of the experiment) will be subjected to biochemical analyzes. It is planned to determine the general level of selected signal particles that regulate germination (hydrogen peroxide) and the response to oxidative stress at the cellular level: low molecular weight antioxidants (ascorbate,

glutathione), a marker of oxidative damage to cell membranes (malondialdehyde) and the level of energy activity of seeds (adenosine triphosphate) . The selected indicators will allow to assess whether and to what extent the variable sensitivity to environmental conditions is reflected at the biochemical level.