

Temperature effects on germination and seedling behaviour on chickpea (*Cicer arietinum* L.) varieties

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Abstract

Today, one of the areas of consumption that has the greatest impact on the environment is food. The significant reduction of Earth's water resources makes it required to transform the structure of our nutrition since the population will reach nearly 10 billion people by 2050, which is an increase of 25% from the current level. It is becoming more and more important to identify and investigate alternative plants and other protein sources that can contribute to meeting the protein needs of the growing number of people while managing their unbalanced nutritional status. Legumes (Family *Fabaceae*), which occupy a special place among protein plants, contribute to the diversity of plant cultures, which is useful for human food, animal feed, and industrial use. One of the oldest known and cultivated legume plants is Chickpea (*Cicer arietinum* L.). It can be successfully grown in humid conditions, even without irrigation since it is an extremely drought-tolerant plant, which attribute is becoming more and more important as the climate changes. Among the environmental factors, drought stress can considerably affect the germination and the emergence of seedlings. The success of chickpea cultivation depends on the amount and type of precipitation that endures the initial growing of seeds.

The most important value measuring property of seeds is germination, which shows the percentage of sown seeds that grow into plants. In order to increase chickpeas' agroecological potential, germination biological tests should be conducted first. The purpose of the study was to investigate the germination biology of chickpea, which has gained importance recently due to the fact that the climate of Hungary is becoming more favourable for the cultivation of this plant as a result of protein import dependency and energy crisis. Our goal is to improve the knowledge of chickpea biology and add relevant information to it so it can be utilized guide future production practices.

The research is conducted under laboratory conditions at the Research Laboratory of Plant Production Sciences Institution to ensure the conditions requested. During the testing period, different temperature levels were used as the most important environmental factors that influence germination are temperature and light. The seeds were obtained from the Plant Breeding Research Station placed in Iregszemcse, Hungary. Due to the difficulties associated with seed germination, the varieties used in the experiment have certified properties to guarantee the requirements specified. The germination test is performed with four replications (each Petri glass as one replicate). The number of germinated seeds is conducted daily until the end of the test.

Based on our tests, temperature affected germination of seeds of Hungarian breeding chickpea varieties. Seeds fail to germinate on higher constant temperatures. The highest percentage germination under constant temperature was recorded at 30°C. The interactive effect of temperature exposure during incubation period improved germination. Maximum seed germination for the Hungarian breeding chickpea varieties was observed when seeds were subjected to alternating temperatures of 30°C.

This research examines different behaviour to a variety of environmental temperatures, providing key information about chickpea germination requirements.

Keywords: chickpea, germination, cicer arietinum, climate change, laboratory conditions

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