The 2nd International Seed Science and Technology Conference of Iran
"Seed 2024"
(Medicinal Plant, Crop, Horticulture, Pasture & Forest)
seed2024.razi.ac.ir

The Effect of Storage Time and Temperature on Germination of Onion(Allium cepa L.) Seeds

Bita Oskouei

Faculty member Seed and Plant Certification and Registration Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran)

Introduction: Seed deterioration defined as a decrease in seed quality, viability, and seed germination due to aging or the effect of inappropriate environmental factors. In addition, senescence may be considered as a gradual decrease in biological performance with the risk of increasing changes that lead to seed decay and eventually death over time (Kapoor et al., 2010). The decrease in seed viability due to aging has been attributed to a set of metabolic defects that occur in embryonic and non-embryonic structures. Storage temperature and moisture content are important factors affecting seed longevity. Generally, moisture content is more effective than temperature (Khan et al.,2016). One of the main limitations of onion cultivation is the low availability of high quality seeds at the time of cultivation, which is due to the poor storability of onion seeds in the environmental temperature and relative humidity

Materials and methods: The experiment was conducted in 2021-2022 at the Seed Testing Laboratory in the Seed and Plant Certification and Registration Institute as factorial based on completely randomized design. In this research, onion seeds were stored for 15 months in two conditions: 1- 5 °C and 60% humidity, 2- 25 °C and 30% humidity. Experimental treatments included: storage temperature at 2 levels (5 and 25 °C) and storage period at 5 levels (3, 6, 9, 12 and 15 months). After passing each storage period, 400 seeds were planted in four replicates in between paper substrate. The containers were placed in the growth chamber for 12 days based on standard conditions of the International Association of Seed Testing Rules (constant temperature of 20 degrees Celsius and illumination of 1250 lux) (Anonymous, 2024). At the end of the test period, the percentage of normal seedlings was determined (Anonymous, 2018).

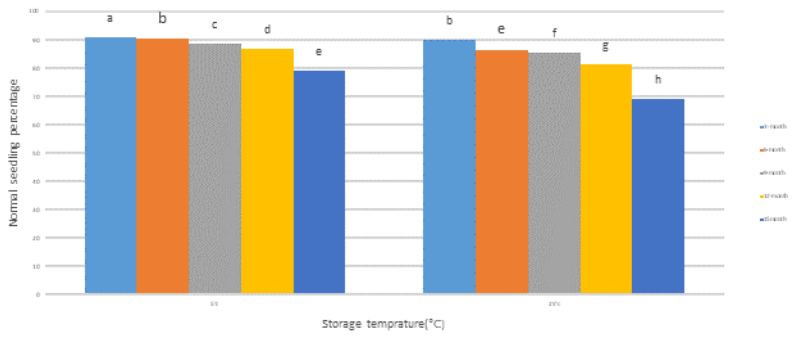

Figure 1- Interaction of storage temperature and duration on normal seedling percentage.

Results and Discussion The variance analysis results showed that the interaction effect of storage period and storage temperature has significant effect on normal seedling percentage. The average comparison showed that the storage temperature after 3 months of storage has no significant effect on the normal seedlings percentage but in the storage periods of 6, 9, 12 and 15 months, the percentage of normal seedlings at the storage temperature of 5°C was significantly more than 25°C. The highest normal seedlings percentage were observed after 3 months of storage at both 5 and 25 °C (about 90%) and the lowest (about 68%) was at 25 °C after 15 months of storage(Fig. 1). Other experiment on the aging of cotton seeds aging indicated the main reason vigour loss is lipid peroxidation and disruption of mitochondrial function and ATP production (Basra et al., 2003).

Conclusion: The results of this research showed that onion seeds are very sensitive to the storage period and storage conditions and increasing the storage temperature and storage time leads to a significant decrease in seed germination. It is suggested that if the seeds produced are not consumed in the same year of production, in order to ensure proper establishment in field conditions, in addition to the germination test, the seed vigour should also be checked.

keywords : normal seedling , storage, vigour

References

[1] Anonymous. (2018). ISTA Handbook on seeding evaluation.4th Edition. Zurich, Switzerland.

[2] Anonymous. (2024). International rules for seed testing. International Seed Testing Association (ISTA). Zurich, Switzerland

[3] Basra, S.M.A., Ahmad, N., Khan, M.M., Iqbal, N., Cheema, M.A. (2003). Assessment of cottonseed deterioration during accelerated aging. Seed Science and Technology. 31. 531-540.

[4] Kapoor, N., Arya, A., Siddiqui, M.A., Amir, A. and Kumar, H.(2010). Seed Deterioration in Chickpea (Cicer arietinum L.) under Accelerated Ageing. Asian Journal of Plant Sciences. 9. 158-162.

[5] Khan, FA., Rifat, M., Sumati N., Bhat, SA., Raj, N., Khan, FU. (2016). Reversal of age-induced seed deterioration through priming in vegetable crops – a review. Advances in Plants & Agriculture Research. 4. 403–411.