

Investigation of the effect of altitude from the sea level on physical properties of *pistacia atlantica* seeds

(Case study: of Sustan Reserves in West Azerbaijan province)

*Ghodrat Rahimzadeh, Rahim Mirzaei Mola Ahmad

Forest division expert, Ilam Agricultural and Natural Resources Research and Education Center (AREEO), Ilam, I.R.Iran

*Corresponding author. Email: gh.rahimzadeh@ut.ac.ir

Introduction

Seed production is one of the key factors in the regeneration of plants and trees and is widely used in regeneration, forest development, afforestation, and especially seedling production in nurseries. Therefore, it is very important to select quality and ripe seeds with suitable physical shapes. In general, elevation is one of the factors limiting the spread of plants. The aim of this study was to investigate the effect of the altitude factor on the physical properties of *pistacia atlantica* seeds in *Sustan* Reserve, which is one of the four *pistacia atlantica* reserves in *West Azerbaijan* Province. The reserve was divided into 4 altitude classes including 1515, 1615, 1715, and 1815 meters above sea level. In each sample plot, three stems and from each stalk 5 clusters were randomly collected and the physical characteristics of the seeds included: cluster length, – number of fruits per cluster, fruit length, fruit width, fruit weight, seed weight, and percentage of seedlessness in each Elevation class was examined.

Methods and Materials

The study area of *Sustan* Reservoir is one of the four important reserves of pistachio in *West Azerbaijan* province with an area of 43 hectares, which is located in *Sustan* village of *Sardasht* city between the length of 5352216 to 535157 east and latitude 4034195 to 4033292 north and is the dominant species. It is *Pistacia atlantica*, for the dominant slope of the south and southwest, the dominant slope is 64%, and the average height above sea level in this reserve is 1615 meters. For study periods including cluster length, fruit length, fruit, fruit weight, seed weight, and seed void percentage, the desired storage was divided into 4 altitude classes including 1515,

1615, 1715, and 1815 meters above sea level (slope factor). (Geographical direction and equalized), The reservoir area was divided into one-hectare (100 * 100 m) sample plots in order to increase the altitude above sea level, and in each of these samples, a 100% census was performed (Zubairi, 2000). Also, in order to study and compare seed stands, three seed stands in each sample plot, including the thickest rootstock, the smallest rootstock, and a middle diameter, which was determined after 100% counting, were randomly selected and marked. (Yuosefi, 2001). A total of 60 trees were selected and 5 clusters from each rootstock were randomly collected in the north, south, east, west, and center of the canopy and the physical characteristics of the seeds in each elevation were studied. A sampling of data obtained from field operations and measuring the desired parameters were performed using Excel and SPSS software and the desired averages were calculated. Mean comparison and analysis of variance were performed using the F test and Duncan and Kruskal-Wallis multiple comparison tests (for abnormal data such as Seedlessness).

Results & Discussion

The results of the analysis of variance and comparison of standard deviation and mean quantitative characteristics of seeds showed that the measured traits included: cluster length, fruit length and width, number of fruits per cluster, and fruit and seed weight at a 99% confidence level at different altitudes. The length of the cluster had an increasing trend with increasing height from the second floor. The number of fruits in the cluster increased with increasing altitude. The length of the fruit had an irregular trend with increasing height. Fruit width showed an irregular trend with increasing height. Fruit weight had an irregular trend with increasing height. Seed weight increased with increasing altitude. Also, statistical analysis comparing the percentage of seed porosity of coriander trees at different altitudes by the Kruskal-Wallis test showed that there is no significant difference in this regard. In total, altitude 1815 has the highest amount of cluster length, number of fruits per panicle, and seed weight, altitude 1715 has the highest amount of fruit weight and fruit length, and height 1515 has the highest amount of fruit, which indicates the greater compatibility of pistacia trees in this altitudes. A comparison of the results of this study with other similar studies shows the effect of habitat height and height on the studied characteristics. Heidari in a study to investigate the effect of altitude on the quantitative characteristics of seeds in the forest

of Shadi Garden in Yazd showed that the altitude range of 2100 to 2500 meters has the highest characteristics of seed length and width with an average of 9 Is. And 7 mm (Heidary et al., 2012). But in the present study, the highest amount of fruit length and width characteristics were seen in the height range of 1715 and 1515 meters, respectively, with an average of 4.96 and 3.53 mm, which is approximately equal to half of the average of these characteristics in the study. Regarding the character of the average weight of 1000 seeds in the present study, the altitude range of 1815 meters with an average of 28.8 grams has the highest average weight of 1000 seeds, which in comparison with Heidari with an average of 50 grams in the forest of Shadi Garden, Yazd, Again shows a much smaller value (Heidary et al., 2012). The existence of such differences indicates the effect of climatic conditions on the characteristics of seeds and the need to study the environmental conditions for the selection of suitable mother plants.

Conclusion

The results of the analysis of variance on the physical properties of seeds of wild pistachio in *Sustan reservoir* in West Azerbaijan province showed that all traits at different altitudes have a significant difference of 99%. Cluster length, seed weight, and the number of fruits per panicle increase with increasing height, and fruit width and seed void percentage decrease with increasing altitude. Also, fruit weight and fruit length have irregular changes. Changes in seed porosity were not significant with increasing altitude. The percentage of seed voids can be due to reasons such as lack of proper pollination, sexual reproduction problems, the presence of defective flowers in the corm, parental incompatibility, etc., which need to be studied.

Keywords: Altitude, Fruit length, Fruit weight, Fruit width, Pistacia atlantica forest, Seedlessness, seed weight.

Acknowledgment: The present study was conducted with the financial support of the Agricultural Education and Extension Institute.

Declaration of conflict of interest: The authors declare that they have no conflicts of interest.