



Assessment of water stress tolerance of squash (*Cucurbita maxima* Duchesne) local landraces by application of D-Mannitol during germination and growth stage

3

5

1

2

Insaf Msetra¹, Wassim Saadaoui¹ and Neji Tarchoun^{1,*}

High Agronomic Institute of Chott Mariem, research laboratory LR21AGR05,
University of Sousse, Tunisia

Abstract.

8 9 10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25 26

27

28

29

30

31

32

33

34

35

Over the past twenty years, climate change becomes inevitably and shows its consequences all over the globe as a result of global warming and have induced the drought stress which is considered as one of the most serious environmental stresses occurring especially in arid and semi-arid regions. Therefore, it is a necessity to make development of species and varieties which are tolerant to drought or being economic efficiency with less water availability. In this context, the present work was conducted both in the laboratory and under greenhouse, with the objective of detecting the tolerance to water stress of four squash (Cucurbita maxima Duchesne) local accessions selected for their tolerance to salinity among a previously studied collection. These tests were performed using D-Mannitol with four concentrations of 0, 100, 200 and 300 mM. The germination stage, germination potential, vigor index, relative water content and some agro-morphological parameters related to seedlings characteristics were recorded. At the plant stage, (6 source leaves), the following parameters were recorded: chlorophylls, carotenoids, chlorophyll fluorescence, PAR. In addition, the analysis of some osmolytes such as malondialdehyde, proline, phenols, flavonoids and DPPH activity were performed on both roots and leaves. The results show that germination is clearly affected by high doses of D-Mannitol, with however a slight variation between accessions. The same trend was noted for all physiological parameters. At 300 mM, 'Karkoubi orange' and 'Batati orange' germinated and developed strong roots compared to the control, whereas 'Galaoui' could only germinate at 200mM. The most sensitive accession to this stress is 'Bejaoui' which, beyond 100mM, its germination is almost absent. This behavior was confirmed by the analysis of the photosynthetic activity as well as by the biochemical parameters at the growth stage of plants on both roots and leaves. These findings can be extrapolated into efforts to develop more water tolerant squash landraces and exhaust the possibilities of using less water under changing climate conditions.

Keywords: drought stress, D-Mannitol, *Cucurbita maxima* Duchesne, seed germination, seedling, osmolytes.