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EVALUATION OF LOCAL AND INTRODUCED ALFALFA *"Medicago sativa,L."* POPULATIONS UNDER GRADUAL SOIL SALINITY CONDITIONS

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ABSTRACT

The main objectives of this recent study, was to quantify salt- tolerance of eleven local and introduced alfalfa populations in terms of germination, early season growth and successive cutting responses. The recent study was carried out during the period between September 2016 to 2018. A diagonal diagram for soil sampling was made. Depending on soil analysis, the experimental site was divided to four strips with different soil salinity gradient.

Eleven genotypes of alfalfa "*Medicago sativa*,L." represented the available local and introduced population (Makka, Ramah1, Nubaria1, Siwa1, Siwa2, Frafra, Sohage, Egaseed, Sopsta, Siriver, Pakistani), were evaluated under each of the aforementioned soil salinity gradients in four separate experiments. the studied alfalfa genotypes were tested in a randomized completely block design of six replicates. Plot area was 2.4 m^2, represented by three rows of four meters long, at 0.2 meter apart. Seeding rate was 60 Kg.hectar. Sowing date was mid- September, in EL-Tahrir. The first cutting was taken after 60 days from sowing, Total of 17 cuttings were taken, the following characters were recorded.

Germination percentage over the evaluated populations, significantly differed from recording date under all salinity levels. The studied alfalfa populations gave significantly different field germination scores over recording dates in all four experiments. the studied populations maintained similar germination percentage.

Early season responses of evaluated alfalfa populations were traced by subsequent recording of growth indicating characters. Plant height, significantly responds to salinity levels at early seeding stage. The responses of alfalfa populations were significantly different at the three recording dates. Salinity levels affected alfalfa leaves, stems, and roots dry weight, in both recording dates(after 40 and 60 days from sowing).

Plant fresh and dry weights were significantly affected by soil salinity levels. While, the studied alfalfa cultivars were significantly similar in fresh and dry plant weight. The interactions between salinity levels and alfalfa cultivars were significant for fresh and dry plant weights.

Neither salinity levels nor genotypes had any significant effect on alfalfa number of branches. Also, the interaction between salinity levels and cultivars was insignificant. Over genotypes, the obtained figures for number of branches/m^2 were significantly similar.

Number of nodules/Plant was traced as an indicator of symbiosis success in relation to soil salinity level at sowing and genotype. Soil salinity levels had insignificant effect on number of nodules. Genotypes, responds similary indicating similar number of nodules.

Green and dry forage yields at first cutting were not affected by soil salinity at sowing. Genotypes gave significantly different green forage yield, while, dry forage yield among cultivars was insignificant. The interaction between soil salinity levels and cultivars was not significant for any of green or dry forage yields. Over the studied genotypes, similar green forage yields were obtained from sowing alfalfa in different soil salinity levels, ranging between 15.33 and 23.42 $t.ha^{-1}$.

Over soil salinity levels, Makka, Nubaria 1, Siwa 2 enjoyed the highest significant green forage yield at first cutting of 19.24,22.18, and 20.22 $t.ha^{-1}$. The other studied cultivars gave significantly lower green forage yield ranging between 18.79 and 17.15 $t.ha^{-1}$. The interaction between soil salinity levels and cultivars had not reached the level of significance. Over all studied genotypes, similar dry forage

yields were recorded from sowing in gradient soil salinity levels ranging between 3.73 and 2.44t.ha^{-1}**.** Also, alfalfa genotypes, produced similar dry forage yields ranging between 2.65 and 3.52 t.ha^{-1}**.** The interaction between soil salinity and cultivars had not reached the level of significance, indicating similar response of genotypes in magnitude or trend to salinity gradient.

Alfalfa genotypes response to soil salinity levels was traced through sixteen successive cuttings. Cuttings, salinity levels, and genotypes had a significant effect on alfalfa plant height. The effect of salinity levels varied with cutting. Genotype's plant height significantly varied with variable cutting. Alfalfa plant height were highest during spring and summer cuttings. Significantly Low plant heighest were recorded at fall and winter cuttings. Substantial reduction in alfalfa plant height was obtained with further salinity levels raise with only significant response

Cutting, salinity level, and genotype had significantly affected of average fresh and dry weight of alfalfa plant. Average plant fresh weight (g.20plants^{-1}), reflected an improvement in average plant fresh weight with progress of production years over salinity and genotypes, where, the heaviest plant fresh weights were recorded by the second year of growth.

Leaves/stems ratio was significantly affected by cutting, salinity levels, and genotypes. Winter season cuttings enjoyed the highest significant values of leaves/stems ratio. While spring and summer cuttings significantly gave lower leaves/stems values. The least leaves proportions were scored at summer season cuttings of the first growing years.

Number of branches was significantly ($P \geq 0.01$) varied with cuttings, salinity levels at sowing and alfalfa genotypes. The highest significant number of branches was provided by any of the three cuttings following the first cutting. The obtained number of branches was significantly descending with progress of cuttings until the end of the second growing season.

Cutting and salinity levels gave significantly variable green and dry forage yields. In the meantime, the evaluated genotypes gave significantly different green and dry yields. Although, cutting gave variable green and dry yields with variable salinity level, Genotypes produced variable yield and/or variable rank within cutting and salinity levels. The highest significant green forage yield (t.ha^{-1}) was produced by the sixth cutting, the least significant green forage yield was produced from late winter cutting. Cuttings of the first growing season, were of higher magnitude than the corresponding at the second growing season.

Commonly, spring and summer cuttings, gave reasonably higher green forage yield than late winter and autumn cuttings. Obtained dry forage yield as an average over soil salinity levels at sowing and genotypes, reached the highest value by cutting number six. While, the least dry forage was obtained by cutting ordered fourteen. Winter and autumn cuttings, scored less than two tons of dry alfalfa forage per hectare, while, cuttings of spring and summer gave at least two tons and more. Dry forage yield that corresponded each studied soil salinity level was significantly similar.

All local alfalfa cultivars gave an average green forage yield**.** Cutting, with superiority of Frafra and Siwa 1. The introduced cultivars, Italian and Australian, significantly gave lower green forage yields.