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ORIGINAL ARTICLE

Correlation Coefficient Analysis (Path analysis) and the Direct and indirect Effects of studied traits on alfalfa yield under Normal and Salinity Stress Conditions

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ABSTRACT
In order to evaluation and assessment of salinity on the alfalfa different traits under salinity, a factorial test conducted in the plot of complete random by two factors. The first factor appeared in 3 salinity levels and witness and the second factor appeared in 3 repetitions of 5 alfalfa varieties. Statistical analysis of data showed a significant difference between varieties and care of studied traits in this step. Traits causality analysis of the total dry showed that the yield most directly was influenced by the leaf dry weight and most indirectly was influenced by the leaf number by means of stem numbers. The high correlation between the leaf numbers with the stem numbers confirms this result.
Key Words: alfa alfa, path analysis

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INTRODUCTION

Soil salinity is considered one of main hindering factors in agriculture production. The salinity of soil and water resources is another main problem in agriculture, especially in arid and semi arid regions. Today over 10% of the world total land (950 million hectares) is affected by salinity [11 ,8]. We have a poor quality of water resources now. In many cases the water that was considered inappropriate and were not satisfactory, is currently used in agriculture. In this regard and in order to further expanding of agriculture, the lands cultivated with salt and use of water – soluble salts are considered. Thus the agriculture, knowledge of different responses of plants to salinity and understanding of the damage caused by salinity in crops is so important [9].

Alfalfa (*Medicago sativa*) is known as the queen of forage and is considered an important food for livestock with high nutrition(10). There are many varieties of salt tolerance among the different varieties of alfalfa [9, 10]. In general, alfalfa is relatively tolerant to salinity and will endure Esp. between 40 to 60 percent [1,11]. Most reports reveal that the stage of plant growth is more sensitive to salinity. Low concentration of salt in the medium and early stages of growth causes tuber yield in alfalfa delayed and its number reduced. But if the salt stress is applied to the plant after the plant setup, it will have fewer effects on gland formation [2, 3].

MATERIALS AND METHODS

The experiment consisted of five varieties of alfalfa (Siah rood, GareYonje, Hashtrood, Khorkhor and Bash kandi) and salinity level (10, 20 and 30 m mouse) and control factorial implemented in completely randomized design with three replications in greenhouse. After applying the standard salinity cares on the considered units, the control of greenhouse temperature and humidity, pests and diseases were conducted and taking note of required attributes (total dry weight, leaf dry and moisture weight, stem dry and moisture weight, the bush height and the number of leaf and stem) and statistical analysis was done by MSTATC, EXCEL and Path.

RESULTS AND DISCUSSION

Table and figure (1) shows correlation analysis and the direct and indirect effects of studied traits on total dry yield. The leaf dry weight has direct effect (P=0/56%). Its indirect effects was considerable by stem dry weight (P=0/91%). So under salinity stress, the importance of indirect weight of leaf is more than its

direct weight by stem dry weight, the leaf number, stems number and height. It affects the dry total weight growth more.

Dry stem weight has direct effect (P=0/33) on the total dry weight. This trait indirectly affects the total dry weight by height (P=0/90), the leaf number (P=0/90) and stem number (P=0/84). Hence under salinity stress, the indirect effect of the height and the leaf and stem number on the total dry weight is more than direct effect of the stem dry weight.

The total dry weight (P=0/08) is influenced by the height positively and insignificantly. But we can see a positive and significant indirect effect by the leaf number (P=0/87) and the stem number (P=0/87). It shows the bush indirect effect by the leaf and stem number is more than its direct effect. The total dry weight is influenced directly negative and insignificant (P=-0/04) and indirectly positive and significant (P=0/97) by the leaf number. The stem number affects direct, positive and insignificant (P=0/074) the total dry weight. So we can conclude that the varieties selection by direct and indirect effects of traits on the total dry yield is important under salinity stress and proves the high correlation of studied traits. So the selection can be made based on optimal conditions according to the possibilities and corrective purposes, the correlation between direct and indirect effects on yield and total dry matter yield. One of the practical aspects of reaction is dependent on the choice of the indirect effects. In many cases, selection for a trait is problematic because of the problem in the true measurement, high costs, and low heritability, therefore the selection of desirable trait is easier with the simple and high correlation traits [4 ,5 ,6]. The diagonal numbers show direct effects and the numbers out of that stand for indirect effects.

Table1. Analysis of phenotypic traits with total plant dry matter yield of alfalfa to the average conditions direct and indirect effects.

No	Trait	Leaf dry weight	Stem dry weight	The bush height	The leaf number	The stem number	The phenotypic correlation
1	Leaf dry weight	0/56	0/30	0/07	-0/037	0/068	0/98
2	Stem dry weight	0/51	0/33	0/07	-0/037	0/064	0/095**
3	The bush height	0/50	0/30	0/08	-0/035	0/064	0/93**
4	The leaf number	0/51	0/30	0/07	-0/04	0/072	0/92
5	The stem number	0/51	0/28	0/07	-0/039	0/074	0/91**

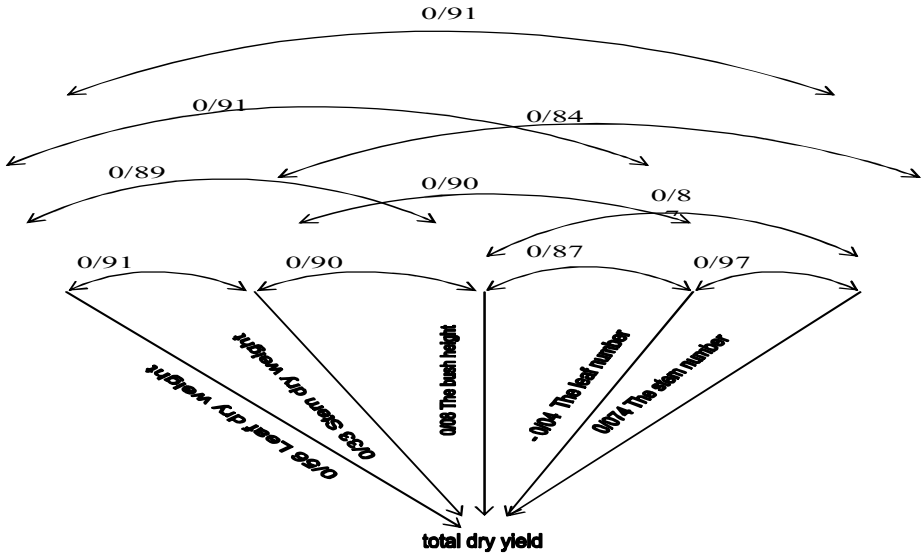

Figure1. Causality diagram for some alfalfa studied traits

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