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Original Article

The Effect of Cover Soil Salinity on Button Mushroom Yield

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ABSTRACT

It is possible that the imbalance of nutrients due to salinity effect extends to available nutrients, adsorption or division of nutrients into plants or it may be a result of physiological inactivation from a certain nutrient matter, leading to starvation of plant for that fundamental element. Salinity reduces the cumulative nitrogen and phosphorous in plants. In this research, the effect of electrical conductivity (EC) has been examined on rate of growth and yield of mushroom. In an experiment, four samples of cover soil with ECs of 4500, 3000, 1500 and 6000 ds/m in three replicas in the beds prepared in baskets were tested. Given that the obtained diagrams of each stage of harvest, it is concluded that the best EC of cover soil for optimal mushroom growth is 1500 mos micro quantitatively and qualitatively so that it is not otherwise acceptable for growing of mushroom. For this purpose, it should be noted that the sources for securing the cover soils must be prepared from places where there is no salinity problems and if they have high EC, the soils should be washed by water. The peat soils of provinces of Char Mehal, West Azerbayajan and northern area have the best soils for covering.

KEYWORDS: EC, Mushroom, Soil Salinity, Khouzestan.

INTRODUCTION

Edible button mushroom belongs to phylum Basidiomycota, class Basidiomycetes, subclass Holo-Basidiomycetidae, order Agaricales and family Agaricaceae. In the 12th International Congress on Science & Edible Mushroom Breeding held at West Germany in 1987, the name of Agaricus bisporus (edible button mushroom) was adopted for white species having two spores on basidium. The name of button mushroom was derived from its shape appearing at the beginning of growth stage, although this stage is transient and at the final stage the mushroom takes an umbrella shape. The fruiting organs have a stipe which holds a broad and umbrella-shaped cap called pileus(Nik nehad, Abbas 1998).

The initial studies on nutrient requirements of edible button mushroom (A.bisporus) have been first conducted by two scientists, Treschow (1994) and Boss (1959). In the pure cultivations prepared for this purpose, it is found that the highest activation of mushroom mycelium occurs on carbohydrates of xylose and arabinose (five carbon sugars); both of them are found plentifully in the wheat stem and can be used by mushroom mycelium at the initial stage (Treschow 1994).

Salinity is a potential problem for arid and semi-arid regions around the world. While all the soils have a small amount of dissolved salts, which is essential for products, the problem arises when the accumulated salts in the soils reach the extent to which they become harmful for plants. The salinity seriously changes the root setting condition, the dissolved soil osmosis potential and the dissolved ion normal balance. The worst effect of salinity is that inhibits the growth of the plants which is followed by decrease of yield.

Three main potential constrains that are primary conditions for growing the plants are:

1- Water stress that arises from negative potential (osmosis potential) around root setting.
2- Ion specific toxicity which often relates to excess chloride sodium absorption and other ions.
3- Being imbalance of nutrients or imbalance stress caused by ion.

The insufficiency of water in plants can be reflected by non-succulence. Since the water potential of saline soil dissolved by osmosis potential solutions falls at lower level, the intracellular osmosis potential should be decreased either by increasing of the number of solvent species (increased sap) or by enhancing the chemical compound capacity of water. In absence of such responses, the texture of plant losses its succulence and because extending the cell is depended on succulence and turgor pressure, they strongly help the growing of plants (Babanian Jelodar, Nadali, Zia Tabar Ahmadi,Mirkhalegh 2002).

The second problem that occurs for those plans subjected to salinity is the effect of toxic ions on biochemical and physiological process. The specific ions such as CI and Na+ cause to disruption of layer structure of protein's molecules. These forces resulting from disruption of ions affect the membrane as well, which its maintenance is the

basis of biological process reactions. The additional ions or toxicity is defined as conditions in which high inner ions concentration reduces the growth (Babanian Jelodar, Nadali, Zia Tabar Ahmadi,Mirkhalegh 2002). Effect of Salinity on Micro-nutrients.

It is possible that the imbalance of nutrients due to salinity effect extends to available nutrients, adsorption or division of nutrients into plants or it may be a result of physiological inactivation from a certain nutrient matter, leading to starvation of plant for that fundamental element. Salinity reduces the cumulative nitrogen and phosphorous in plants. Apart from macro-nutrients, salinity or alkalinity may lead to deficiency or disorder of micro-nutrients such as zinc, manganese, iron and copper. In the saline soil, solubility of micro-nutrients is too low and those plants grown in such soils have starved of these elements. Many of researchers have stated that bivalence cation- rich solutions increase the concentration of manganese in stem, whereas the salinity circumstances in which their cations are mostly single valence the concentration of manganese is decreased (Babanian Jelodar, Nadali, Zia Tabar Ahmadi,Mirkhalegh 2002).

Table 1. Table of analysis of variance to compare treatment means according to Duncan test.

sig	F	Mean squares	Degrees of freedom	Sum of squares	EC(ds/m)	
0.026	7.084	19903.444	2	39806.889	Between groups	6000
		32809.667	6	16858	Within the Group	
			8	56664.889	Total	
0.001	29.023	43176.778	2	86353.556	Between groups	4500
		1487.667	6	8926	Within the Group	
			8	95279.556	Total	
0.000	82.63	40396.778	2	80793.556	Between groups	3000
		488.889	6	2933.333	Within the Group	
			8	83726.889	Total	
0.002	20.221	55310.778	2	110621.556	Between groups	1500
		2735.555	6	16412	Within the Group	
			8	127033.556	Total	

MATERIALS AND METHOD

In this research, the effect of electrical conductivity (EC) has been examined on rate of growth and yield of mushroom. In an experiment, four samples of cover soil with ECs of 4500, 3000, 1500 and 6000 ds/m in three replicas in the beds prepared in baskets were tested. The dimensions of these baskets were 17 cm depth, 36 cm width and 60 cm long. After having filled with composite, the net weight each basket reached up to 17 kg. These baskets were set in a special hall under mushroom cultivation.

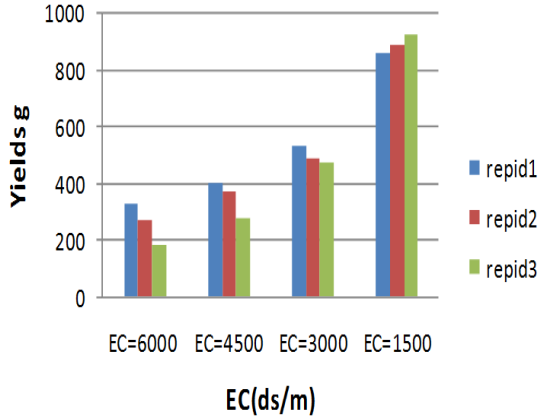

Fig. 1. A diagram for yield value in the ECs tested over first stage of harvest.

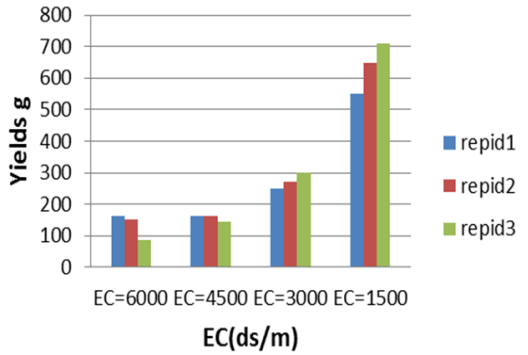

Fig. 2. A diagram for yield value in the ECs tested over second stage of harvest.

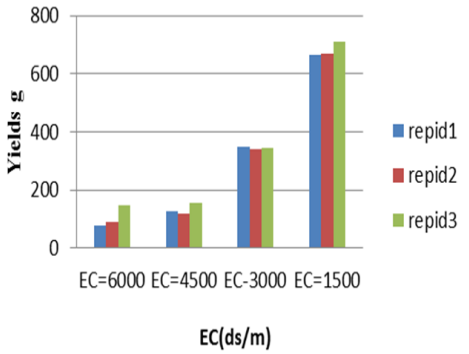

Fig. 3. A diagram for yield value in the ECs tested over third stage of harvest.

RESULTS AND DISCUSSION

The analysis table of mean comparison showed that the amount of P-Value of all the treatments is less than 0.05, indicating a difference. Over the time of casing, it was seen that in various ECs, the way of growth is different. In the ECs of 6000 and 4500 the growth was abnormal and localized so that from edges of composite and where the soil on the bed was thin, the growth was very strong and in the other points, no growth was seen at all .

In the ECs of 3000 this situation was better, the distribution of mycelium was almost more acceptable and steady,but in EC1500 the growth was desirable and steady, so that on fifth day it was observed that the root was moving upward in all the soil points and on the same day, for higher ECs the difference was quite obvious, so that the ruffling operation was delayed.

CONCLUSION

On third day, after ruffling, the hall was entirely prepared for air delivery stage and because the beds were not prepared at this stage, they were transferred to hall which had good preparation for this stage. In the following day, the different ECs had a different growth condition, so that EC1500 was air delivered similar to beds under hall cultivation and the higher ECs had grown unsteadily in such a way that along with hall were entered the air delivery stage.

On the ninth day, the pins in size of swing pins had been grown in the entire beds of hall and EC 6000 in the edges pins' basket was very thick and abnormal. However, this condition toward low ECs was more desirable so that EC 1500 was almost similar to the whole hall. On the twelfth day of air delivery in which the harvest of the first products was started, the appearance of mushrooms in the ECs of 6000 and 4500 were entirely malformation; however in the ECs of 3000 and 1500 this condition was better.

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