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Trace of Salinity of Sodium Chloride with Outcome on Enhancement Features of Herbage

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Abstract: Salinity has a variety of salts, one of which is salinity of sodium chloride. Different plants react differently to salinity and their performance will vary according to their resistance, which after all the treatments, chlorophyll was measured. Depend on the outcomes of salinity consequences on native herbage; herbage features such as relative chlorophyll and chlorophyll fluorescence were decreased. Also, salinity reduced the amount of potassium in the leaf and root, as well as increased sodium levels in the leaves and roots. This trait is the highest in control treatment and the lowest in treatment with 125 mg/L sodium chloride. Root length index was decreased to 1.25 mg/L sodium chloride in comparison to control treatment. This attribute is the level of 25 mM was not significant compared to the control. At the highest level of salinity (125 mM/L sodium chloride), the sodium content of the limb increased by about 3.5 times as much as the control. The number of leaves and the relative chlorophyll content of the control treatment were 48.65% and 52.31% higher than the salinity treatments. According to the article the potassium content of stems and roots in the control treatment is higher than that of 125 mg, 55.7% and 66.53%. And the sodium content of stem and root of the control treatment was reduced to 69.57 and 14.17, respectively, to 125 mg. In the control treatment, inarticle, potassium content is higher than sodium, but in the 125 mg salinity treatment, the sodium content is higher than that of potassium. And the amount of 125 mg salinity treatment in Sodium was 49.26% higher than the sodium root. And the amount of 125 mg salinity treatment in potassium is 68.22% higher than potassium root. Chlorophyll fluorescence inarticle. In control, treatment is 17% higher than salinity treatment.

Keywords: Sodium Chloride, Chlorophyll, Potassium, Salinity

Introduction

About half of the world's water is affected by salinity. The best method for obtaining proper function in saline soils is using saline resistant plants (Hayley *et al*., 2013). A degree of the sensitivity of vegetables is very different from soil salinity (Juchem *et al*., 2012). The most sensitive vegetables are salinity of celery and radish soil and the most resistant are spinach and beet. Salinity has several types, one of which is sodium chloride salinity. In this Article, features such as relative chlorophyll, chlorophyll fluorescence, sodium levels and potassium of root and stem were measured (Greenwood *et al*., 1980).

A Review of Prior Studies

Salinity increases the concentration of soluble salts and water-soluble mineral soils that results in salt accumulation in the root zone, to the extent that prevents optimal growth of the plant (Chris, 1996). The first accumulated ions are sodium and chlorine, but cations such as calcium and magnesium and anions such as sulfate and bicarbonate also cause salinity (Hardegree *et al*., 2000). The other side of these effects is the high amount of sodium or calcium in the soil that can interfere with the absorption of other elements or the metabolism of the plant. Salinity reduces the percentage and rate of germination in both groups of pretreated seeds (Durrant *et al*., 1993; Khorasani and Armstrong, 1990).

Mr. Ghorbani was done on wheat seeds. The effects of salinity on all germination components including the time to germination, time to 90% germination, uniformity and emergence were very significant and salinity increased the percentage, speed and uniformity of germination in wheat (Kamkar *et al*., 2004). Sodium chloride increases osmotic potential due to the inhibitory effect on water absorption by seed (Francisco and Grattan, 2009). Germination percentage and root and shoot length of wheat decreased with increasing salinity stress. Sodium chloride has a toxic effect on the embryo and endosperm cell membrane (Farooq *et al*., 2007). Other causes of growth and plant depletion due to salinity, increased energy consumption in the plant to extricate the invading sodium ions that are present in large amounts (Foti *et al*., 2008).

Materials and Methods

This Article was performed from October 2013 to spring 2014 in Isfahan University of Technology Research Center at Isfahan University of Technology to consider the trace of brininess (sodium chloride) on formation signs of Isfahan native herbages.

In this research, seeds of native herbage were provided and fumigated with hypochlorite 2%. Also, vases with a height of 30 cm and a diameter of 25 cm were fumigated with 25% Vichy (Gulzar and Khan, 2001). The combination of occupied and sand was blended in a 1: 1 proportion. In order to do this probe, five areas of salinity of 25, 50, 75, 100 and 125 millimoles were provided and practiced. All salinity dilutions, in addition to sodium chloride salt, need 1 to 1000 times the fluorine (Haigh *et al*., 1985). The 25-milliliter saline solution that was provided was 60 liters and 87 grams of sodium chloride and 60 grams of fluorine were required to make this dilution.

Firstly, about two-thirds of the vases were cumulated with pre-provided blending medium (cocopeat and sand) (Harris *et al*., 2001). Then in each vase, four grains were planted with spacing. For the time of planting, the seeds should be intact and then sprinkled slightly onto the seeds to cover the surface (the quantity of soil on the seed area is roughly the greatest seed diameter). Irrigation was carried out after planting pots (Foti *et al*., 2002). The pots were located in 6 rows of 5 rows and a salinity treatment was applied in each row. To keep away from changing and changing the vases, labeling is needed (Ghavami and Rezai, 2000). First, irrigation was carried out at short interims. The endemic herbage of Isfahan has a fast pullulation so that in this article, about 70% of seeds peeped three days after planting. Therefore, low drought and irrigation can cause their buds to dry (Fret *et al*., 1991).

In the first stage, all of the vases were irrigated with control dilution (water and fluorine). This irrigation continued until two original leaves, which continued for 14 days (Hus and Sung, 1997). In the second step, we irrigated the control row with the control solution and all other rows (25, 50, 75, 100 and 125) with 25 mg solution to barricade the herbages from experiment sudden stress. In the third step of the first row with the control dilution, the second row was irrigated with 25 mM dilution and the rest of the rows were irrigated with 50 mM dilution (Heydecker, 1977).

Results and Discussion

The topic of salt acceptance has received a tremendous amount of consideration during the past two decades. The perception of developing salt-tolerant vegetations, even to the degree that they can be grown with seawater, captures the imagination of both the technical and the public sector (Grieve *et al*., 2004). In leaves of kind of species, the Ca and Mg concentration reduced with enhancing salinity level. harmful alterations in the mineral composition of forage species in response to salinity can be kept down by selecting proper species. In many cases, the value of the water is reduced exclusively because of its higher salt absorption (Kaur *et al*., 2002). Even though quantifiable evidence on crop salt tolerance occurs for kind of crop species, there are many herbages which lack definitive data (Robinson *et al*., 2004) herbages crops are well-defined as herbaceous types grown for human feeding in which the eatable portions consist of leaves, roots, hypocotyls, stems, petioles and flower buds (David *et al*., 2007). The salt acceptance of herbal types is significant because the cash value of herbages is usually high. Some universal data is offered on how salinity affects herbage growth and progress and how diverse measurements of salinity in solution cultures, sand cultures and field studies can be reconciled to a public origin. The salt acceptance of herbages has been condensed and reported in a uniform plan based on the best existing information (Elisa *et al*., 2019; Michael 1997). Differences and contradictions exist in some of the data due to differences in cultivars, environments and experimental conditions. For a great number of kinds little or no valuable data occurs and there is a clear need for research. In universal, herbal growth and vital oil content and yield decreased with an increase in water salinity in all the types (Grattan *et al*., 2004). There is a wide range of salt acceptance in vascular herbals. There is presently a necessity to progress new direction and cohesive impetus in the area of salt-tolerant crops growth. Accumulation of salinity in the root zone can be harmful to sustained crop production (Harris, 1996). Irrigation, even with temperately saline water, impulses collected salts deeper into the root zone, allowing roots to increase in regions of relatively low salinity (Suyama *et al*., 2007). The salinization and water shortage of soil are extensive environmental difficulties in limiting plant survival, growth and productivity (Heidari-Sharifabad *et al*., 2006). However, some herbages could adopt some strategies to resist salinity and drought stresses. We conclude the results of salinity generate by Na salts when water is not restricting, is related not only to plant species but also to their stages of growth (Guzman and Olave, 2004). There is a range of herbages that are proficient of growing under situations of saline soil and water. At high salt concentrations, production levels drop and the plant options diminution meaningfully (Hussian *et al*., 2006). Significantly, however, the mineral composition of the herbages may be expressively changed by the concentration and kind of salts in the soil and water (Jumsoon *et al*., 1996).

This trait was highest in control treatment and showed the lowest amount at 25 mg/L sodium chloride. The comparisons showed that salinity levels of 25 mol/L sodium chloride significantly reduced leaf relative chlorophyll content compared to control treatment. Salinity levels of 25 with 50, 75 and 75 with 100 levels do not differ significantly (Table 3) (Michell, 1995).

Reducing the number of leaves was under the influence of salinity treatment, with the trait at the level of 100 mM/L, the highest decrease. The number of leaves of 25 and 50 and 75 mM/L salt sodium chloride did not differ significantly (Table 3) (Kara, 1998).

Increased ion leakage has been affected by salinity treatment, so that this trait has the highest level and has the lowest level in salinity treatment with 125 mg/l sodium chloride (Table 4).

As the results indicated, the sodium content of the root increased proportional to the salt concentration, so that in the control treatment, 25 and 50 mM/L sodium chloride, the lowest amount of sodium accumulation in the root was observed and at the level of 125 mg/L, the highest sodium chloride Sodium of the root was observed (Table 4).

Thus, this trait has the lowest amount in control treatment and has the highest rate in 125 MM sodium chloride treatment. The difference between other salinity concentrations was also significant (Table 4).

Also, the results of this experiment indicated that in the cucumber of the native variety of Isfahan, with an increasing salt concentration in the environment, the amount of sodium in the leaf and root increased (Table 5). By comparing the results, it was found that the sodium ion concentration in the root was generally higher than the earial Limb. With increasing salinity levels, more sodium was accumulated in the root of the plant, while sodium was found to be less in its leaves (Tables 1 and 4).

Table 1: Analysis NaCl of variance of salinity effects on ion leakage and the amount of sodium and potassium elements in root and stems in native cucumber in Isfahan

		Average of square				
Freedom change	Sources of degrees	Ion leakage percent	The amount of potassium in the root (mg/g dry weight)	The amount of potassium in the stem (mg/g dry weight)	Sodium content of the root (mg/g dry weight)	Sodium content of stem (mg/g dry weight)
Salinity	5	100.445**	0.01**	1.46**	0.01**	10.08**
Treatment error	12	9.369	0.468	0.751	0.710	1.578
Total error	17	-	-	-	-	-
CV	-	3.40	5.61	3.38	4.98	3.54

**At 1% level, the difference is significant

Table 2: Analysis of variance NaCl of effect on chlorophyll fluorescence indices measured in third leaf of high in Isfahan native cucumber

		average of squares			
Freedom change	Sources of degrees	Fo	Fv	Fm	Fv/Fm
Salinity	5	8221.79**	13587.10**	3476.96**	0.0052**
treatment error	24	19.46	134.90	12.05	0.0001
total error	29	-	-	-	-
CV	-	1.96	1.53	0.33	1.50

**At 1% level, the difference is significant

Table 3: Comparison of the mean of salinity NaCl effects on leaf number, ion leakage and relative chlorophyll in native cucumber of Isfahan

Treatment	Ion leakage percent	Number of leaves	Relative chlorophyll
Witness	81.304^{d}	7.40^{a}	32.50^{a}
Salinity 25 mM	88.945^{bc}	6.40^{b}	25.50^{b}
Salinity 50 mM	87.467^{c}	6.20^{b}	26.50^{b}
Salinity 75mM	89.532^{bc}	6.00^{b}	23.50^{bc}
Salinity 100 mM	93.794^{ab}	4.80^{c}	20.50^{c}
Salinity 125 mM	98.349^{a}	3.80^{d}	15.50^{e}

In each column, averages that have at least one common alphabet, based on the LSD test, have no significant difference at the 5% probability level

Table 4: The effect of NaCl salinity on sodium and potassium elements of root and shoots of isfahan native cucumbers

Treatment	Potassium stem (mg/g dry weight)	Potassium root (mg/g dry weight)	Sodium Stem (mg/g dry weight)	Sodium root (mg/g dry weight)
Witness	83.174^{a}	34.992^{a}	26.668^{e}	28.664^{d}
Salinity 25 mM	53.702^{b}	28.956^{c}	63.820^{d}	29.680^{d}
Salinity 50 mM	46.374^{c}	32.556^{b}	70.372^{c}	30.376^{d}
Salinity 75mM	47.798^{c}	23.052^{d}	75.220^{b}	33.904^{c}
Salinity 100 mM	40.170^{d}	15.048^{e}	94.024^{a}	37.192^{b}
Salinity 125 mM	36.854^{e}	11.712^{f}	96.232^{a}	42.832^{a}

In each column, averages that have at least one common alphabet, based on the LSD test, have no significant difference at the 5% probability level

Table 5: Comparison of the mean of salinity effects NaCl on chlorophyll fluorescence indices measured in third leaf of high in Isfahan native cucumbers

Treatment	Fo	Fv	Fm	Fv/Fm
Witness	843.80^{a}	1083.2^{a}	227.40^{b}	0.779^{a}
Salinity 25 mM	798.00^{b}	1074.2^{b}	222.80^{b}	0.742^{b}
Salinity 50 mM	758.20^{c}	1062.2^{c}	208.00^{c}	0.713^{c}
Salinity 75mM	741.80^{d}	1040.8^{d}	222.40^{b}	0.712^{c}
Salinity 100 mM	727.20^{d}	1029.2^{e}	222.80^{b}	0.706^{c}
Salinity 125 mM	699.00^{e}	1016.4^{f}	247.60^{a}	0.687^{d}

In each column, averages that have at least one common alphabet, based on the LSD test, have no significant difference at the 5% probability level

Reducing the number of leaves was under the influence of salinity treatment, with the trait at the level of 100 mM/L, the highest decrease. The number of leaves of 25 and 50 and 75 mM/L salt sodium chloride did not differ significantly (Table 5).

The analysis table for variance (4-4) shows that salinity had a significant effect on ion leakage at 1% probability level. Increased ion leakage has been affected by salinity treatment, so that this trait has the highest level and has the lowest level in salinity treatment with 125 mg/l sodium chloride (Table 5).

This trait was highest in control treatment and showed the lowest amount at 25 mg/L sodium chloride. The comparisons showed that salinity levels of 25 mol/L sodium chloride significantly reduced leaf relative chlorophyll content compared to control treatment. Salinity levels of 25 with 50, 75 and 75 with 100 levels do not differ significantly (Table 5).

According to the variance analysis Table 1, in this experiment, the effect of salinity on potassium content of the root was significant at 1% probability level. The results showed that with increasing salt concentration, potassium content of the root decreases, except for the 25 and 50 treatments, which correlate the photo mode. The highest root potassium in control treatment and the lowest amount in 125 mM/L sodium chloride treatment was observed (Table 4) (Jennette *et al*., 2002).

The analysis table for the variance of 2-4 showed that the effect of salinity on leaf potassium levels was significant at 1% probability level. The mean comparison table also indicates that, with increasing salinity levels, the amount of potassium in the plant's earial Limb decreased. At the highest salinity level (125 mM/L sodium chloride per liter), the amount of potassium obtained in the leaf of the plant was 25.2 times lower than the control treatment. In this experiment, the highest amount of potassium accumulation in the control group was observed in the control group. Conversely, this trait showed the lowest level at 125 mM/L sodium chloride (Table 4).

The analysis of variance Table 4 showed that the effect of sodium chloride on the chlorophyll fluorescence index was significant at 1% probability level. The results of the data showed that the mean chlorophyll fluorescence index decreased with increasing salinity level, which indicates the effect of salinity on the efficiency of the photosystem. As the results showed, chlorophyll fluorescence index was highest in control treatment but decreased with increasing salt concentration, so that chlorophyll fluorescence index decreased at the lowest salinity level (25 mM/L sodium chloride) compared to control and ultimately at the highest salinity level (125 mM/L sodium chloride), which was about 1.1 times lower than the control. Also, the results indicated that the chlorophyll fluorescence index showed a lower reduction in the aerial limb growth index, which was measured with increasing salt concentration (Table 5) (Herbage *et al*., 1974).

The chlorophyll fluorescence index is a good measure of photosynthetic activity and can be used to evaluate the damage to the photosynthetic device. In this experiment, data analysis showed that the mean chlorophyll fluorescence index decreases with increasing salinity levels, which indicates the effect of salinity on the efficiency of the photosystem (Table 3).

The analysis of variance Table 2 showed that the effect of sodium chloride on the chlorophyll fluorescence index was significant at 1% probability level. The results of the data showed that the mean chlorophyll fluorescence index decreased with increasing salinity level, which indicates the effect of salinity on the efficiency of the photosystem. As the results showed, chlorophyll fluorescence index was highest in control treatment but decreased with increasing salt concentration, so that chlorophyll fluorescence index decreased at the lowest salinity level (25 mM/L sodium chloride) compared to control and ultimately at the highest salinity level (125 mM/L sodium chloride), which was about 1.1 times lower than the control. Also, the results indicated that the chlorophyll fluorescence index showed a lower reduction in the aerial limb growth index, which was measured with increasing salt concentration (Table 5).

Conclusion

The concentration of sodium ion in the root is greater than that of the air. With increasing salinity, more sodium was accumulated in the root of the plant, while sodium was found to be less in the leaf. With increasing salt concentration, the highest root potassium in control treatment and the lowest amount in 125 mg/L sodium chloride treatment were observed. At the highest level of salinity (125 mm/L sodium chloride per liter), the amount of potassium obtained in the leaf of the plant was 25.2 times lower than the control treatment.

And according to Table 1, the potassium content of the stem is 141.161 higher than the potassium content of the root. (In dry state) and the sodium content of the stem is higher than the sodium content of the root at 458.299 (in dry condition). And the treatment error for sodium levels is higher than the potassium error rate. Treatment error has a 34% root stroke rootstock root stock root error and Sodium stalk treatment error is 52.4% higher than stem potassium. And potassium stalk treatment error is 37.68% higher than root potassium. Sodium stalk treatment is more than 55% higher than root sodium. Figure 2 shows Formal review of salinity pressure in herbs and commensurate inherent physiological answers. It also displays Salinity stress at begins and the result of Salinity stress is Recovery/Adapation. It divides two stages Osmotic stress and Ionic stress. Then both of them follow Signal transduction (call death). Two stages (Osmotic adjustment , Ion homeostasis) follow Recovery/ Adaption.

Fig. 1: Salt in farmland

The trace of salinity of sodium chloride on herbages features of local plants in area has a minus trace in enhancing the condensation of salinity conduct, subtractive in herbage features such as relative chlorophyll, chlorophyll fluorescence and number of leaves decreases.

Figure 1 show s a fram which is measured it's effect of the salt in farmland. It considers salinity stress in herbs and conforming essential biological answers. Two stages (Osmotic stress and Ionic stres) due to the Signal transduction and two stages derives from Signal transduction (Osmotic adjustment Accumulation of ions/organic compounds and Ion homeostasis Na+ extrusion/Na+ copmpartmentation/Na+ reabsorption) then They due to the recovery/adpation (Partly adapted from Horie *et al*., 2012).

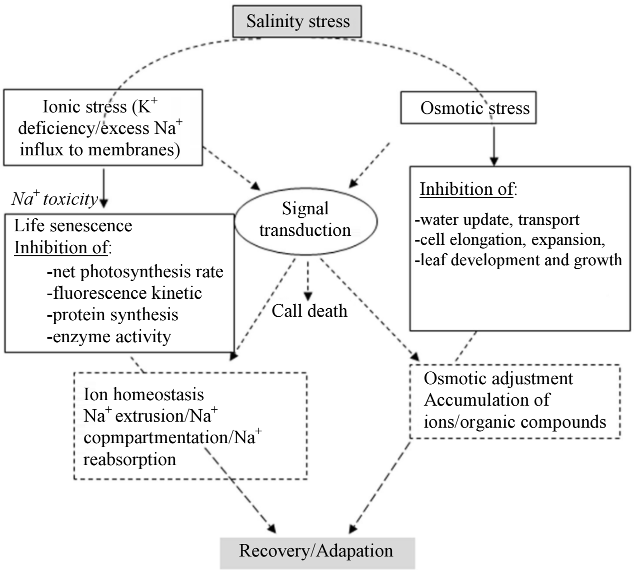
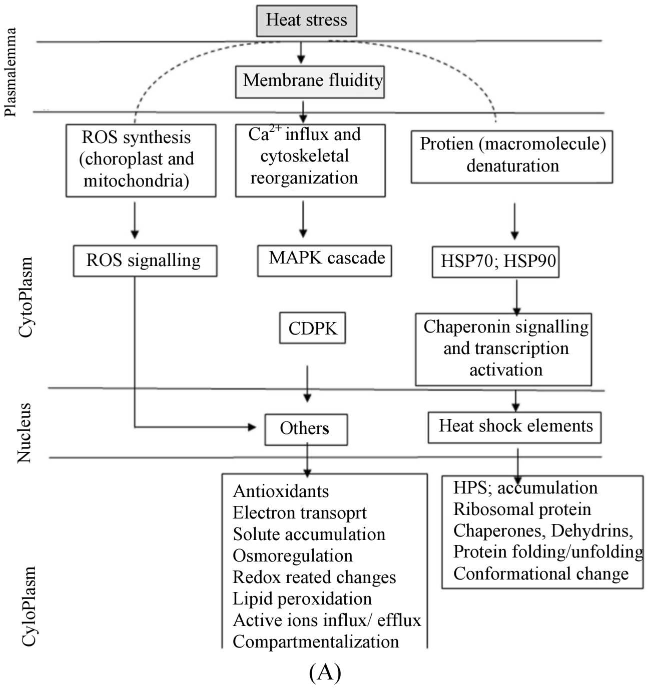
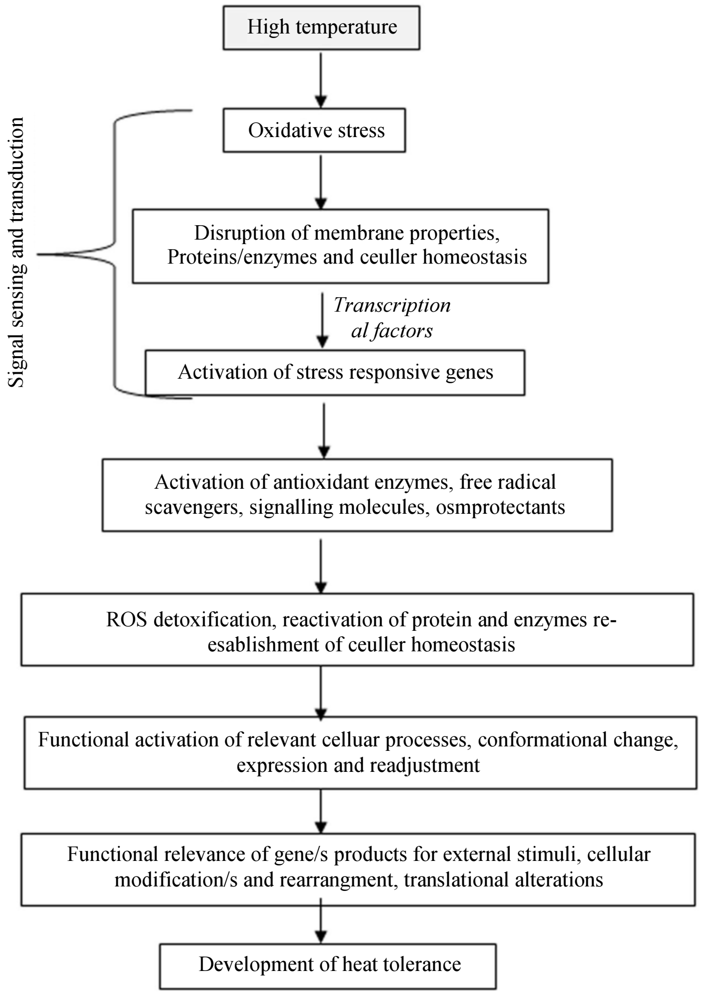


Fig. 2: Schematic summary of salinity stress in plants and corresponding intrinsic physiological responses (Partly adapted from Horie *et al*., 2012)





(B)

Fig. 3: (A) Illustration of heat-stress tolerance mechanisms in plants. MAPK, Mitogen activated protein kinases; ROS, reactive oxygen species; HAMK, heat shock activate kinases; HSE, heat shock element; HSPs, heat shock proteins; CAPK, calcium dependent protein kinase; HSK, histidine kinase (Partly adapted form Wahid *et al*., 2007). (B) Schematic representation of heat induced signal transduct ion and development of heat tolerance in plants (Partly adapted from Hasanuzzaman *et al*., 2013a)

This article was operated only in relation to vegetative features. It is proposed that the trace of sodium chloride therapy on output and output. Also, the article was carried out with sodium chloride saline therapy and thus the next offer of trialing of other salinity therapys on herbal and functional features. The herbing bed was an amalgamation of cocopeat and sand. It is better to test on local herbages of area in other sub stratums.

Figure 3 displays Design of heat-stress acceptance instruments in herbs. MAPK, Mitogen triggered protein kinases; ROS, sensitive oxygen types; HAMK, heat shock trigger kinases; HSE, heat shock component; HSPs, heat shock proteins; CAPK, calcium reliant on protein kinase; HSK, histidine kinase (Partly adapted form Wahid *et al*., 2007). It also shows Diagram depiction of heat persuaded indication transduct ion and expansion of heat acceptance in herbs (Partly adapted from Hasanuzzaman *et al*., 2013a).

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Author's Contributions

All authors contributed to design the study, write and revise the manuscript.

Ethics

The present Study and ethical aspect were approved by the Isfahan University of the Technology. The present study was approved by the Isfahan University of Technology.

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