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ORIGINAL ARTICLE

Salinity Effect on Important Components of *Portulaca olearcea* L.

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KEYWORDS

Portulaca olearcea L.;
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ABSTRACT: The seeds of *Portulaca olearcea* L. were grown evenly as possible in these pots, then they were watered with tap water, and after (10 days) after the seeds germinated, each group of them was flooded with concentrations of NaCl salt, which are (5, 10, 20) dSm^{-1} and distilled water. The increase in NaCl concentration in irrigated water led to a decrease in chlorophyll a and b, carotenes, protein, TAA, and vitamin C continent. At the same time, it induced increases in both proline and TSS. Irrigated water salinity decreases vitamin C until in lower concentration ($5dSm^{-1}$). They reduced each vitamin A, total alkaloids and flavonoids, and six kinds of fatty acids a-lenolic acid, ecosopentaenoic, docosahexaenoic, linoleic acid, palmate acid, oleic acid, and stearic acid, which all were decreased under salinity.

INTRODUCTION

In any section of the planet as an ecosystem capable of affecting all creatures directly [1] Purslane, *Portulaca oleracea* L., is an annual herb characterized by succulent leaves that change color due to light availability [2]. It has a wide distribution in tropical and subtropical regions of the world, where it is eaten and added to a variety of dishes in a variety of countries [3]. It is a member of the Portulacaceae family. It is an excellent medicinal plant [4] due to its high antioxidant properties and is described as the best source [5]. Thus, it is used as a herb for various therapeutic objectives, including preventing specific cardiac ailments and promoting a healthy immune system [6, 7].

In other places, it is referred to as purslane [8]. It thrives on hot soils and has high salinity, making it a halophyte plant [9, 10].

MATERIALS AND METHODS

Preparation of plants

A sandy agricultural soil type has been determined to plant the Purslane plant's seeds (*Portulaca oleracea* L). The pH, EC, PPS, tissue, and total organic matter of these soils were studied according to standard methods used to know soil investigations [11].

The soil was distributed in similar-sized pots, each with a capacity of (3 kg) of soil, and then these pots were divided into five groups, each group consisting of five pots.

The Purslane seeds were grown evenly as possible in these pots, then they were watered with tap water, and after (10 days) after the seeds germinated, each group of them was watered with concentrations of NaCl salt, which are (5 , 10, 20) dSm^{-1} and distilled water.

Then water the plants continued for a month (30 days), when it was observed that the plant had reached a part of vegetation that could be picked (the pre-flowering stage), after which all of the primary compounds were measured.

Study of biochemical response

The contents of chlorophyll A, chlorophyll B, and Carotenoids were determined from fresh leaves samples after extracting them by action 80% [12]. The proline concentration ware decided according to the method of [13], total protein content was determined by using UV-

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VIS Spectrophotometer at 650nm and using Bovine Serum Albumin was used as the standard [14]. The total antioxidant activity was determined by phosphomolybdenum method, and recorded absorbance at 695nm using an UV/Vis spectrophotometrically against the blank—Dubois method [15]. Wase was dependent on determining Total Soluble Sugars (TSS), Will Vitamin C be calculated from fresh sample corrodent to the standard method used in biochemistry lab [16].

Study of some secondary product

To determine the plant content of (Alkaloid, Flavonoid, and Vitamin A), we used a UV-Spectrophotometry device to estimate total alkaloids [17].

Total phenols were detected by using gallic acid and Folin-Ciocalteu reagent, and the absorbance value was recorded at a wavelength of 765 nm. [18] , then the total flavonoid content was determined according to the Folin-Ciocalteu method [19], and to know the plant content of vitamin A, samples were taken to determine the vitamins and prepared according to the regulations and their contents were crushed in a ceramic slurry until a homogeneous mixture was obtained [20]. And to determine the plant content of some fatty acids the fat was estimated based on the (AOAC 1995) method using the Soxhlet fat extraction device. The fatty acid compounds were analyzed using a gas chromatograph (GC-2010) [21].

RESULTS AND DISCUSSION

Table 1 explained the effect of increasing salinity on biochemical responses of *P. olearacea* L. The increase in NaCl concentration in irrigated water led to a decrease in chlorophyll a and b, carotenes, protein, TAA, and vitamin C continent. At the same time, it induced increases in both proline and TSS. In suitable environmental conditions, plants form a good quality of photosynthesis pigment. Still, in salinity conditions, it will affect these pigments adversely due to decreased Mg uptake and dilapidates chlorophyll [22].

Protein is an essential component of the living cell, and it is significantly affected by salinity that it will precipitate [23]. In this study and although the *P. olearacea* L. is a halophyte, the protein content recorded a significant decrease significantly in the treatment with 20 d.cm due to the ability of this species to tolerant, moderate levels of salinity [24], on the other hand, there was a significant increase in proline concentration to prevent the negative effect of salt ions aggregation in plant cell [25], and this phenomenon was recorded in other studies like the effect of heavy metals on *Raphanus sativa* [26], or wastewater effect on ornamental piper [27].

It is well known that *P. olearacea* L is rich in vitamin C [28]. The results explained that irrigated water salinity decreases vitamin C in lower concentrations (5 d.cm). The medical and food importance of porsulan due to its secondary metabolite products [29].

Each vitamin A, total alkaloids, and total flavonoids (Table 2) were affected by salinity and recorded a significant decrease. Thus it reduces plant importance as a medical plant. This plant is very rich in omega-three fatty acids [30]. This work determined the concentrations of six fatty acids: a-lenolic acid, ecosopentaenoic, docosahexaenoic, linoleic acid, palmate acid, oleic acid, and stearic acid, which all were decreased under salinity (Figure 1), which may due to the action of salinity in reducing the ability of vegetable plants to utility from nutrients in the soil which then reflect on their benefit [31] .

Table 1. Effect of salinity on some biochemical responses in *P. olearacea* L.

Parameter	Concentrations			
	(0 dSm^{-1}) NaCl	(5 dSm^{-1}) NaCl	(10 dSm^{-1}) NaCl	(20 dSm^{-1}) NaCl
Vitamin C (mg.g^{-1}F.W)	96.0696	64.726	56.2685	60.248
TSS (µg.g $^{-1}$F.W)	127.004	84.579	84.958	67.534
Proline (µmole.g $^{-1}$F.W)	0.466	0.928	0.8955	2.118
protein content (mg.g $^{-1}$ F.W)	31.294	9.072	4.066	3.3335
TAA (mgAAE.g $^{-1}$F.W)	10.502	5.4775	13.487	16.273
Chl. A(mg.g $^{-1}$ F.W)	8.380	6.728	5.992	5.074
Chl. B(mg.g $^{-1}$ F.W)	6.543	4.767	4.096	2.412
Carotenoids(mg.g $^{-1}$ F.W)	1.24	0.443	0.4685	0.395

Table 2. Effect of salinity on some secondary metabolite product in *P. olearacea* L.

Parameter	Treatments			
	(0 dSm^{-1}) NaCl	(5 dSm^{-1}) NaCl	(10 dSm^{-1}) NaCl	(20 dSm^{-1}) NaCl
Total Alkaloid (%)	3.48	2.92	2.46	2.05
Total Flavonoid (mg Rutin. gm^{-1})	0.83	0.57	0.37	0.27
Vitamin A (IU)	883.73	651.06	430.06	328.4

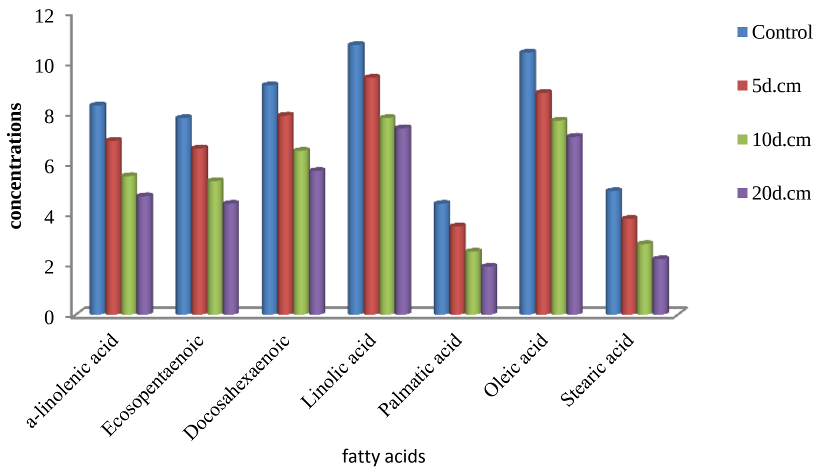

Figure 1. Effect of salinity concentrations on some studied fatty acids in Portulaca oleracea L

CONCLUSIONS

Despite P. oleracea L.is a halophyte, it cannot tolerate elevated salinity concentrations. High salinity reduces the medical importance of this species as a source of antioxidant substances. It reduces omega -3 fatty acid contents.

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Conflict of interests

None to declare.

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