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Letter to the Editor

Biochemical Changes in Two Parsley (*Petroselinum crispum* L.) Varieties during Saline Stress

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Dear Editor in Chief

Parsley root has been used medicinally since ancient times for possible medicinal qualities including antioxidative, antimicrobial, laxative, antihyperlipidemic, anticoagulant and antihepatotoxic (1). The parsley importance is attributed to its high vitamins content (mainly vitamins C), antioxidants, and some mineral elements such as iron, as well as volatile oils that play an important role in the pharmaceutical and food industries (2). Because of many antioxidants present in this plant, supplementation of the diets with fresh parsley leaf cans significant increase antioxidant capacity which play a special role in people nutrion (3). But unfortunately abiotic stresses, such as salinity, can decrease persley growth. For this reason, plants have developed some protection mechanisms against the harmful effects of reactive oxygen species (ROS) formed after the stresses and to alleviate their deleterious effects. To protect cells and to keep the levels of ROS under control, plants generate non-enzymatic and enzymatic antioxidant systems (4, 5). Measurements of the antioxidant enzyme activity may provide information concerning the degree of exposure of plant tissues to ROS.

Although the *Petroselinum crispum* is now cultivated throughout the world our study refers at two parsley seeds variants (cultivated for roots and leaves production) growth in saline conditions. To investigate the response of these parsley variants to NaCl treatments some antioxidative enzymes - superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) in 14-days old parsley seedling were investigated. Thus, the seeds of each parsley variants were placed in plastic pots containing soil and watered with different NaCl (50mM, 100mM, 150mM) concentrations. Distilled water was used for control. The watering was carried out for 14 days, after which the plantlets were collected for biochemical evaluation. It was used spectrophotometric methods (6) for quantification of enzymes activities and it was reported as U/mg protein.

Antioxidant enzymes responses to salt stress of the two varieties of parsley (cultivated for roots and leaves production) were different (Table 1). SOD activity, the first line of cell defense against ROS generated by saline stress had different pattern in the parsley varieties. In *P. crispum* cultivated for roots, the treatment with 100 mM and 150mM NaCl was low being influenced either to increase (3.20%) it or decrease (5.86%) SOD activity, in comparison with control. The saline stress decrease (22.9%) the SOD activity in *P. crispum* cultivated for leaves. At higher concentration 150 mM NaCl the plantlet did not survive.

CAT, major ROS-scavenging enzyme find in peroxisomes, converts the toxic H_2O_2 (formed by SOD reaction) to H_2O and O_2. After NaCl expo-

sure the parsley varieties response in a similar manner as regard the catalase activity. The significant increase of this enzyme was observed at 50mM NaCl, both in *P. crispum* for leaves (32.79%) and for roots (52.14%).

Most important, POD activity decreased concomitantly with the increase of NaCl concentration in parsley for root while in the parsley for leaves the effect was opposite. Thus, in parsley for root, at concentrations 50mM, 100mM and 150mM the loss in POD activity was 42.08% and 10.62% while in the other varieties the arise was 56.91%, 11.85% and 49.29%, respectively. Moreover, because salinity induced enhancement of POD activity in *P. crispum* for roots seedling indicate that cells of this variants had higher capacity for decomposition of H_2O_2.

Table 1: Antioxidant enzymes activities (Mean ±ES) and increase/decrease rates of enzymes in plantlets of *P. crispum* varieties after 14 days of NaCl treatment

P. crispum **(for roots)**	**SOD activity**		**CAT activity**		**POD activity**	
	U/mg protein	**+/- rate(%)**	**U/mg protein**	**+/- rate(%)**	**U/mg protein**	**+/- rate (%)**
0 mM	18.89±1.37	0	171.30±8.92	0	0.98±0.06	0
50mM	29.72±10.40	57.30	260.62±38.98	52.14	1.54±0.42	56.91
100mM	19.50±2.92	3.20	185.80±7.64	8,46	1.10±0.18	11.85
150mM	17.78±0.22	-5.86	291.59±0.61	70.22	1.47±0.03	49.29
	SOD activity		**CAT activity**		**POD activity**	
P. crispum (for leaves)	**U/mg protein**	**+/- rate (%)**	**U/mg protein**	**+/- rate (%)**	**U/mg protein**	**+/- rate (%)**
0 mM	15.73±0.53	0	384.11±32.02	0	1.01±0.15	0
50mM	12.12±0.75	-22.90	510.10±73.49	32.79	0.58±0.28	-42.08
100mM	16.02±0.54	1.86	369.95±42.45	-3.68	0.90±0.07	-10.62
150mM	-		-		-	

Our results evidenced that SOD, CAT and POX activities in 14-days old parsley seedling are different depending on the varieties as well as with NaCl (50mM, 100mM, 150 mM) treatment. In conclusion, considering all the data obtained, from both of these varieties, *P. crispum* for leaves was sensitive to saline stress than *P. crispum* for roots.

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The authors declare that there is no conflict of interests.

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