Screening of Eight Potato Cultivars (*Solanum tuberosum* L.) to in Vitro Growth and production of Microtuberzation Under Salt Stress Conditions Using Some Physiological parameters

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ABSTRACT

The present research was conducted to study the physiological traits of potato seedling to understanding of the plant's response under salt stress conditions, which consequently serves to try to cultivate potato cultivar that are saline tolerant. Eight imported cultivars of potato seeds were selected: Almondo, Arizona, Buren, Everest, Rievira, Rudolf, Sever and Sylvana. A tissue culture was established for the branches of these cultivars to study the effect of different concentrations of sodium chloride (NaCl) on growth properties and the production of microtubers in Vitro. The concentrations (0, 50, 100, 150, 200 mmol) of sodium chloride salt were added to the media of both Murashige and Skoog (MS) each separately and two cutting were cultivated with two nodes per repeater. The results showed that Riviera cultivar showed tolerance to saline stress conditions at the salts concentrations used in terms of growth and production of micro tubers. For plant content of dry substance, Riviera cultivar gave the highest percentage of dry substance at 25.20% while the same cultivar gave the lowest percentage of 0.9% at the concentration of 200 mmol.L^{-1}. In the control treatment, Riviera cultivar was given the highest percentage of protein 3.81%. Significant differences were observed in the effectiveness of the peroxidase enzyme. Arizona cultivar that cultivated in the control treatment (without salt) gave the least effective for enzyme 13.60 Absorption unit.g^{-1}. Riviera cultivar that cultivated in concentration of 150 mmol.L^{-1} gave the highest activity for peroxidase enzyme was 38.0 absorption units.g^{-1}.

Keywords: Potato cultivars, Plant tissue culture, Salt stress

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غربلة ثمانية اصناف بطاطا (*Solanum tuberosum* L.) للنمو وانتاج الدرينات الدقيقة خارج الجسم الحي تحت الشد الملحي باستعمال بعض المؤشرات الفسلجية

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المستخلص

اجري البحث الحالي لدراسة الصفات الفسلجية لفهم استجابة النبات تحت الشد الملحي مما يخدم لاحقاً محاولات استنباط أصناف البطاطا متحملة للملوحة. اختيرت ثمانية اصناف من البطاطا المستوردة هي Almondo، Arizona، Buren، Everest، Rievira، Rudolf، Sever، Sylvana . انشأت مزرعة نسيجية لأفرع هذه الأصناف لدراسة تاثير تراكيز مختلفة من ملح كلوريد الصوديوم NaCl في صفات النمو وانتاج الدرنات الدقيقة خارج الجسم الحي. اضيفت التراكيز0 ، 50 ، 100 ، 150 ، 200 ملي مول من ملح كلوريد الصوديوم الى الوسط Murashige و Skoog (MS) كلاً على حده وزرعت عقلتين بعقدتين لكل مكرر. اظهرت النتائج ان الصنف Riviera اظهر تحملاً لظروف الاجهاد الملحي عند التراكيز الملحية المستعملة من حيث صفات نمو

وانتاج الدرنات الدقيقة. بالنسبة لمحتوى النبات من المادة الجافة اعطى الصنف Riviera المزروع في معاملة القياس اعلى نسبة مئوية للمادة جافة بلغت 25.20% فيما اعطى نفس الصنف اقل نسبة بلغت 0.9% عند التركيز 200 ملي مول. لتر$^{-1}$. أعطى الصنف Riviera المزروع في معاملة القياس أعلى نسبة للبروتين بلغت3.81 % لوحظ وجود فروق معنوية لفعالية انزيم البيروكسيديزاذ اعط الصنف Arizona المزروع في معاملة القياس (بدون ملح) اقل فعالية للأنزيم بلغت 13.60 وحدة امتصاص.غم$^{-1}$. واعطى الصنف Riviera المزروع في التركيز 150 ملي مول . لتر$^{-1}$ اعلى فعالية لانزيم البيروكسيديز بلغ 38.0 وحدة امتصاص. غم $^{-1}$.

الكلمات المفتاحية: اصناف البطاطا، زراعة الأنسجة النباتية، اجهاد ملحي.

* البحث مستل من اطروحة دكتوراه للباحث الاول .

1. INTRODUCTION

Salinity is a stressor that disrupts the natural processes of the organism. Salinity reduces the soil water availability and changes from the water balance within the plant. Therefore, slow plant growth caused by salinity is difficult to separate from the slow growth resulting from other stresses. The salt tolerance standard for the potato (*Solanum tuberosum* L.) and other crops presented in tables based on the values of the salinity levels, on the basis of which the crops were divided into Sensitive, medium and tolerant to salinity. The factors affecting on the salt tolerance criterion are the growth stage, cultivars, nutrition, irrigation management, toxic effects, and Osmosis pressure. [1] In vitro tissue culture technology was applied for production of Microtuberzation and to assess the tolerance of different potato varieties to salt stress, Including the technique of buds cultivation and multi-branches in the nutrient media containing sodium chloride saline [2], The [3] Screening several cultivars of potatoes resulting from in vitro cultivation by The technique of cultivating Apical meristem using (MS) media containing different concentrations of NaCl (0, 750, 1000, 2000, 3000, or 4000 ppm), respectively, Depending on plant tolerance to salt stress, potato was divided into a tolerant, sensitive and highly sensitive salinity from 25 cultivars of potatoes, There were 7 cultivars sensitive and 12 cultivars highly sensitive to salinity , Based on phenotypic indicators. It is therefore necessary to study the physiological traits to understanding the response of the plant under saline tension, which will serve later attempts to develop potato cultivars tolerant to salinity.

2. MATERIALS AND METHODS

The experiment was conducted in the Laboratories of Al-Hayat Al-Khadra company for tissue culture (private sector) during the years 2016-2017, eight cultivars of imported Dutch potatoes were selected, brought their Tubers from the General Authority for testing and certification of seeds (Almondo, Arizona, Buren Everest, Rievira, Rudolf, Sever and Sylvana), which are characterized by their good productivity and resistance to the disease potato crop, Elite rank, has broken the stage of its dormancy and Serology was examined by the Commission. The tubers were washed with running water and liquid soap several times to remove the dust and then left to dry. And incubated at 15-20 ° C in the dark for two weeks to stimulate new sprouts [5]. 4.405 g was dissolved of ready media powder in 800 ml of sterile distilled water is free of ions, the material was dissolved by placing the beaker on the hot plate magnetic stirrer, then add 30 g.L^{-1} of sucrose. The pH of the nutrition media was adjusted to 5.7 using the pH meter and the addition of drops of hydrochloric acid (1 M) or NaOH (1 M). Growth regulators were added as illustrated by the parts of each experiment. Agar Add at a rate of 6 g.L^{-1} for the purpose of solidifying the prepared nutrition media, the nutrition media preheat to boiling point, then distributed in 22 cm long tubes with 2.5 cm diameter and with 10 ml for the tube. Plant growth regulators were added according to the objective of the experiment described for each of them, The tube nozzle was closed using stopper of a transparent polycarbonate, the media was sterilized using a heat sterilizer at 121°C and a pressure of 1.04 kg.cm^2 for 15 minutes, the tubes were pulled out and left to cool at room temperature to be ready for cultivation. Plant parts separated from cultivated tubers were cultivated after

superficial sterilization of the selected cultivars in the growth media. The growth media consists of a group of inorganic salts of micronutrients, micronutrients and iron for the media [4]. MS (1962) added to it 0.1 ($mg.L^{-1}$) of Thiamin, 0.5 Nicotinic acid, 0.5 Pyridoxine, 2.0 Glycine and 100 Myo-Inositol with 30 $g.L^{-1}$ sucrose added 0.1 $mg.L^{-1}$ of GA3 with 1 $mg.L^{-1}$ IAA. The growth media were incubated in the growth chamber under a light intensity of 1000 lux and for a period of 16/8 light / light at 25 ° C. For four weeks, the developing peaks of the eight cultivars were cultured at the germination tissue media of the potato. The results were taken after 4 weeks of tissue culture.

Table 1: MS-ready ingredients of inorganic salts used in the preparation of nutrition media [4]

Compound	Chemical formula	$mg.L^{-1}$
Ammonium nitrate	NH_4NO_3	1650
Potassium Nitrate	KNO_3	1900
Magnesium sulphate	$MgSO_4.7H_2O$	180
Manganese sulphate. H_2O	$MnSO_4.4\ H_2O$	16.9
Zinc sulphate. $7H_2O$	$ZnSO_4.7H_2O$	8.6
Copper sulfate. $5H_2O$	$CuSO_4.5H_2O$	0.025
Calcium chloride $2H_2O$	$CaCl_2.6H_2O$	440
Cobalt chloride. $6H_2O$	$CoCl_2.6H_2O$	0.025
Potassium iodide	KI	0.83
Potassium phosphate monobasic	KH_2PO_4	170
Molybdic acid (sodium salt).$2H_2O$	$Na_2MoO_4.2H_2O$	0.25
Boric acid	H_3BO_3	6.2
Ferrous sulfate. $7H_2O$	$FeSO_4.7H_2O$	27.8
Sodium ethylene diamine tetraacetate	Na_2-EDTA	37.3
Myo-inositol	$CH_3(CH_2)4CH_3$	100
Thiamine-Hcl	$C_{12}H_{17}CIN_4OS.HCl$	0.1
Pyrodoxine-Hcl	$C_8H_{12}ClNO_3$	0.5
Nicotinic acid (free acid)	$C_6NH_5O_2$	0.5
Glycine(free base)	NH_2CH_2COOH	2

Effect of different concentrations of sodium chloride salt in the production of micro tubers

The concentrations of 0, 50, 100, 150, 200 mmol NaCl were added to the media for the production of micro tubers. Consisting of MS media added to it a sucrose with a concentration of 80 $g.L^{-1}$ and Kinetin at a concentration of 7 $mg.L^{-1}$, Agriculture was conducted in tubes containing 40 ml of nutrition media which has been cultivated with two branches of length 3-4 nodes and incubated for 8 hours of illumination and 16 hours of darkness at 16 ± 2 ° C for two weeks. Then the microtubes were harvested and the following measurements were taken:

1- The number of microtubes
2- The average diameter of the microtubes
3- The average fresh weight of microtubes
4- Average dry weight
5- The percentage of the dry substance of the microtubes
6- Proportion of protein for microtubes
7- Measuring the effectiveness of peroxidase enzyme

3. RESULTS AND DISCUSSION

Effect of different concentrations of NaCl in the average number of microtubes for eight cultivars of potatoes cultivated in Vitro.

Table (2) shows that there are significant differences between the cultivars. Rivera was significantly higher in the number of microtubers and reached 6.24 $microtuber.plant^{-1}$, followed by Arizona and

Buren, which were not significantly different from each other and gave (5.58 and 5.54 microtuber.plant^{-1}) respectively, followed by Sever and Rudolph, which did not differ significantly from each other by giving them the number of microtubers amounted to 3.86 and 4.2 microtuber.plant^{-1}. The lowest number of microtubers was Rudolph and Everest which differed significantly from the rest of the cultivars with the number of microtubers accurate 3.18 and 2.7 microtuber.plant^{-1} respectively, Sylvana gave the lowest number of microtubers accurate 1.58 microtuber.Plant^{-1}. As for salt concentrations, there were significant differences between saline concentrations under study, There was a significant decrease in the number of microtubers with an increase in salt concentrations. The control treatment (without salt) gave the highest number of microtubers of 6.51 microtuber.Plant^{-1} and the lowest number of microtubers reached 1.60 at the concentration of 200 mmol, As for the effect of the interaction between both factors, Noted that it was significant and Arizona cultivar that cultivating in the control treatment gave the highest average number of microtubers of 8.60 microtuber.Plant^{-1} while the Buren, Everest, Sylvana, Sever cultivars gave which cultivated at a concentration of 200 mmol.L^{-1} and Everest at 150 mmol.L^{-1}. The lowest number of microtubers reached 1.00 microtuber. Plant^{-1}.

Table 2: Effect of different salt concentrations (NaCl) in the average number of microtubers of eight cultivated cultivars in vitro.

Cultivars	NaCl concentration (mmol)					Average concentration of cultivars
	0	50	100	150	200	
Almondo	4.60	4.50	4.00	1.50	1.30	3.18
Arizona	8.60	7.40	5.60	5.00	1.30	5.58
Buren	7.60	7.30	6.40	5.40	1.00	5.54
Everest	7.70	2.30	1.50	1.00	1.00	2. 70
Riviera	7.70	7. 20	5.90	5.60	4.80	6. 24
Rudolph	7.80	5.20	4.80	2.00	1.20	4.2
Sever	6.50	5.60	3.40	2.80	1.00	3.86
Sylvana	1.60	1.30	2.00	2.00	1.00	1.58
Average concentration of NaCl	6.51	5.1	4.2	3.16	1.60	
L.S.D 0.05	Cultivars = **0.535**		NaCl =**0.423**		Interaction = **1.197**	

Effect of Different Concentrations of NaCl on the Average Diameter of microtubers of eight cultivated cultivars in vitro.

Table (3) shows that there is an effect to the cultivar type in the average diameter of microtubers for eight cultivars of potatoes produced in vitro, Riviera cultivar is significantly excelled by giving it the highest average diameter of microtubers 3.11 mm, did not differ significantly from Buren, which gave an average diameter of 3.06 mm and differed significantly from the Arizona and Almondo cultivars by giving it an average diameter of 2.76 and 2.97 mm, respectively. These four cultivars differed significantly from the rest of the cultivars. As for salinity concentrations, significant differences were noted between the saline concentrations for the average diameter of microtubers. The diameter of microtubers was decreased by increasing the salinity levels. The highest diameter was given in the control treatment (without salt), 3.72 mm and the lowest diameter of 1.71 mm at the concentration of 200 mmol.L^{-1} and the difference was significant, as the diameter decreased by increasing salinity level. As for the effect of interaction between both factors, it was significant, Riviera cultivated cultivar in the control treatment gave the highest diameter of microtubers of 5.37 mm while the Almondo cultivated cultivar in the concentration of 200 mmol.L^{-1}, giving a

lowest diameter of microtubers of 1.08 mm. That the increase in the number of tubers and diameter in the control treatment may be due to the state of balance experienced by the plant without tension, which leads to the division and expansion of cells and the formation of tubers, The decrease in the number of tubers and their amount at the high concentrations of saline is due to the destruction of proteins by action ROS and the inability of the protective mechanisms to repair the damage caused to the cell by these reactive oxygen species (ROS). This causes to further deterioration of cells or plant tissues and the entry of plants in senescence phase. It is known that Oxygen free radicals, One of the most important factors leading to the entry of plants in the senescence phase by activating the antioxidants, including what is enzymatic and non-enzymatic.

Table 3: Effect of different salt concentrations (NaCl) in the average number of microtubers of eight cultivated cultivars in vitro.

Cultivars	NaCl concentration (mmol)					Average concentration of cultivars
	0	50	100	150	200	
Almondo	4.15	3.89	3.72	2.01	1.08	2.97
Arizona	3.20	2.92	2.89	2.65	2.14	2.76
Buren	4.58	3.75	2.64	2.31	2.03	3.06
Everest	2.93	2.81	2.57	2.03	1.81	2.43
Riviera	5.37	3.34	2.81	2.78	1.27	3.11
Rudolph	3.25	2.93	2.24	2.02	1.42	2.37
Sever	3.52	2.42	2.59	2.04	1.80	2.47
Sylvana	2.78	2.87	2.93	2.85	2.09	2.70
Average concentration of NaCl	3.72	3.12	2.79	2.34	1.71	
L.S.D 0.05	Cultivars = **0.12**		NaCl =**0.17**		Interaction = **0.473**	

Effect of Different Concentrations of NaCl on the average fresh weight of microtubers of eight cultivated cultivars in vitro.

Table (4) shows that the cultivar has a significant effect on the average fresh weight of microtubes for eight cultivars of potatoes produced in vitro, The results of the table showed significant difference in fresh weight of the microtubers. Riviera cultivar gave the highest fresh weight of 0.48 g and differed significantly from the two cultivars Everest and Rudolph which gave 0.18 and 0.19 g respectively, As for the effect of saline concentrations, there was a significant difference between salinity levels. It was observed that the fresh weight was decreased by increasing salinity levels. The control treatment (without salt) gave the highest fresh weight of 0.44 g and the lowest fresh weight for treatment of (200 $mmol.L^{-1}$) which reached 0.09 g, As for the interaction between workers, there are significant differences between them, Rivera cultivated cultivar in the control treatment (without salt) gave the highest average fresh weight of 0.70 g and the lowest fresh weight for Everest cultivated cultivar in the 200 $mmol.L^{-1}$ concentration treatment by giving it 0.03 g. It is noted that the Riviera cultivar was significantly excelled on all cultivars at salinity 50, 100 $mmol.L^{-1}$.

Effect of Different Concentrations of NaCl on the percentage of dry substance of microtubers for eight cultivated cultivars in vitro.

Table (5) shows that the cultivar has a significant effect on the percentage of dry substance of microtubers for eight cultivars of potatoes produced in vitro, The results of the table showed significant differences between the studied cultivars, Riviera cultivar gave the highest percentage of dry substance of 14.50%, with significant difference in comparison with all cultivars followed by Arizona cultivar which gave a dry substance percentage of 13.63%. It was significantly excelled on the rest of the cultivars, Everest and Bourn cultivars gave a percentage of dry

substance (12.17 and 12.15%) and Sylvana gave the lowest percentage of dry substance of 10.29%, As for the effect of saline concentrations in the percentage of dry substance, there was a significant difference between saline concentrations. The percentage of dry substance decreased with increasing salt concentrations, control treatment (Without salt) was given the highest percentage of dry substance at 20.40% and the lowest percentage of dry substance was recorded at the treatment with concentration of 200 mmol. The lowest percentage of dry substance was recorded at the treatment with concentration of 200 mmol by giving it 2.90% dry substance, As for the effect of interaction between both factors, There are significant differences, Riviera cultivated cultivar in the control treatment gave the highest percentage of dry substance amounted to 25.20 which also gave the lowest percentage of dry substance of 0.9% when cultivated in the concentration of 200 mmol.L^{-1}, these perhaps due to the fact that increased concentrations of saline caused the lack of regulation of azosis, as well as increase the activity of enzymes oxidation, which caused damage to DNA and proteins and chlorophyll and weak in the effectiveness of membranes, This is caused by the representation of oxidizing substances in the mitochondria, chloroplast and Peroxisomes. These oxidizing agents may activate response to salt stress conditions [7].

Table 4: Effect of different salt concentrations (NaCl) in the average fresh weight of microtubers of eight cultivated cultivars in vitro.

Cultivars	NaCl concentration (mmol)					Average concentration of cultivars
	0	50	100	150	200	
Almondo	0.44	0.36	0.28	0.10	0.05	0.25
Arizona	0.44	0.37	0.21	0.20	0.10	0.26
Buren	0.48	0.40	0.15	0.10	0.06	0.24
Everest	0.32	0.27	0.16	0.14	0.03	0.18
Riviera	0.70	0.63	0.52	0.37	0.17	0.48
Rudolph	0.44	0.20	0.16	0.10	0.06	0.19
Sever	0.37	0.18	0.11	0.40	0.10	0.23
Sylvana	0.32	0.37	0.31	0.18	0.08	0.25
Average concentration of NaCl	0.44	0.39	0.24	0.20	0.09	
L.S.D 0.05	Cultivars = **0.25**		NaCl =**0.03**		Interaction = **0.20**	

Table 5: Effect of different salt concentrations (NaCl) in the percentage of dry substance in microtubers of eight cultivated cultivars in vitro.

Cultivars	NaCl concentration (mmol)					Average concentration of cultivars
	0	50	100	150	200	
Almondo	22.84	11.65	10.74	10.68	4.22	12.02
Arizona	21.31	20.08	11.65	13.11	2.00	13.63
Buren	18.26	13.91	11.92	10.67	6.00	12.15
Everest	21.13	15.56	11.14	11.00	2.00	12.17
Riviera	25.20	24.64	20.79	1.02	0.90	14.50
Rudolph	18.04	15.37	12.55	11.00	3.00	11.92
Sever	16.20	15.20	12.00	10.00	1.00	10.88
Sylvana	20.24	11.20	8.00	8.00	4.00	10.29
Average concentration of NaCl	20.40	15.95	12.34	9.44	2.90	
L.S.D 0.05	Cultivars = **0.06**		NaCl =**0.05**		Interaction = **0.29**	

Effect of Different Concentrations of NaCl in the percentage of protein to microtubers for eight cultivated cultivars in vitro.

Table (6) shows the effect of NaCl concentrations in the percentage of protein for eight cultivars of potatoes produced in vitro. The results of the table showed significant differences in microtubers content from the protein. Rivera was excelled in the percentage of protein which gave 2.68% Followed by Sever cultivar that give 2.56%, Everest cultivar gave the lowest percentage of protein 1.91, which did not differ significantly from Sylvana cultivar, which gave a protein percentage of 1.88, For saline concentrations, it was observed that they differed significantly from each other and that the percentage of protein decreased by increasing saline concentrations. The control treatment (without salt) gave the highest percentage of protein of 3.11%. A treatment with concentration of 200 mmol.L^{-1} gave the lowest percentage of protein reached 1.23%, As for the interaction between both two factors, Riviera cultivated cultivar in control treatment gave the highest percentage of protein 3.81% while Sylvana cultivated cultivar in 200 mmol.L^{-1} concentration gave percentage of protein 1.05%, It was observed that there was a decrease in protein concentrations with increased salinity concentrations due to high salinity affecting the cell content of amino acids, Salinity reduces the absorption of the mineral elements necessary to build free amino acids such as nitrogen, phosphorus, RNA and DNA in the total vegetative [8]. or perhaps due to the fact that high salinity negatively affects the growth of the plant through its influence in the various physiological processes, including the process of building protein [9]. or because high salinity leads to increased protease activity responsible for protein degradation [10]. Consistent with [7].

Table 6: Effect of different salt concentrations (NaCl) in the percentage of protein in microtubers of eight cultivated cultivars in vitro.

Cultivars	NaCl concentration (mmol)					Average concentration of cultivars
	0	50	100	150	200	
Almondo	2.75	1.86	1.42	1.24	1.16	1. 69
Arizona	3.12	2.21	2.15	2.32	1.07	2.17
Buren	1.87	1.58	1.52	1.28	1.12	1.47
Everest	2.83	2.54	1.53	1.41	1.25	1. 91
Riviera	3.81	3.74	2.79	1.78	1.26	2.68
Rudolph	3.14	2.82	2.83	1.72	1.44	2.39
Sever	3.69	3.25	2.24	2.12	1.52	2.56
Sylvana	3.63	2.27	1.26	1.18	1.05	1.88
Average concentration of NaCl	3.11	2.53	1.97	1.63	1.23	
L.S.D 0.05	Cultivars = **0.03**		NaCl =**0.02**		Interaction = **0.08**	

Effect of Different Concentrations of NaCl in the effectiveness of the enzyme Peroxidase to microtubers for eight cultivated cultivars in vitro.

Table (6) shows the effect of NaCl concentrations in the effectiveness of the enzyme Peroxidase for eight cultivars of potatoes produced in vitro. It was noted from the results of the table that the eight studied cultivars were significantly different in the effectiveness of the enzyme peroxidase, Almondo was excelled, gave the highest peroxidase activity of 29.39 absorption units.g^{-1} and did not differ significantly from the Buren, Riviera and Rudolph cultivars which gave the effectiveness of the peroxidase enzyme which reached of 27.23, 27.11 and 27.43 absorption units.g^{-1}, As for the effect of

saline concentrations, significant differences were observed between the concentrations. The control treatment (without salt) gave less effective for the peroxidase enzyme of 19.95 absorption units.g^{-1} and did not differ significantly from the treatment with concentration of 50 mmol.L^{-1} by giving it an effectiveness of the peroxidase enzyme of 22.12 absorption units.g^{-1}, An increase in the effectiveness of the peroxidase enzyme was observed in high saline concentrations (100, 150 and 200 mmol.L^{-1}), which did not differ significantly from each other and gave the effectiveness of the peroxidase enzyme (27.24, 28.87 and 28.91 absorption units.g^{-1}), As for the effect of interaction between both two factors, there was a significant difference. Arizona cultivated cultivar in control treatment (without salt) gave less the effectiveness of the peroxidase enzyme 13.60, Rudolph cultivated cultivar in the treatment with concentration of 150 mmol.L^{-1} The highest effectiveness of the peroxidase enzyme was 38.00 absorption units.g^{-1}.

The results note that high concentrations of NaCl salt has increased the effectiveness of the peroxidase enzyme in the . The growth media that growing in microtubers formation media. This may be due to the fact that high salinity increases the production of ethylene and ethylene to increase the effectiveness of this enzyme [11]. In studies carried out [12] on the relationship between the effectiveness of the enzyme pyroxidase and levels of NaCl salt, it explained that this relationship is positive, The results of our study showed that the effect of salinity on the effectiveness of this enzyme was clearly manifested in the exposure of plants in the stage of tuber formation and may be the stage of the growth of potato plant (the stage of the composition of the storage parts) are the most sensitive stages of salinity as the effectiveness of the enzyme with increasing a salt level.

Table 6: Effect of different salt concentrations (NaCl) in the effectiveness of the peroxidase enzyme in microtubers of eight cultivated cultivars in vitro.

Cultivars	**NaCl concentration (mmol)**					**Average concentration of cultivars**
	0	**50**	**100**	**150**	**200**	
Almondo	27.50	29.22	30.00	30.11	30.11	29.39
Arizona	13.60	19.14	25.00	27.91	27.99	22.33
Buren	20.66	22.23	31.23	30.01	32.00	27.23
Everest	20.40	20.21	22.22	23.00	30.00	23.17
Riviera	20.00	22.21	30.32	38.00	25.00	27.11
Rudolph	17.01	20.01	32.12	33.00	35.00	27.43
Sever	20.12	22.00	23.00	23.00	25.00	22.62
Sylvana	20.33	22.00	24.00	26.00	26.20	23.71
Average concentration of NaCl	19.95	22.12	27.24	28.87	28.91	
L.S.D 0.05	Cultivars = **3.48**		NaCl =**2.02**		Interaction =**3.086**	

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