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Role of Seaweed Extract (Stimax Nature) and Trichoderma Fungus on Productivity Traits of Two Lettuce Cultivars

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Abstract
The study was conducted during the 2024–2025 growing season in the field of the Horticulture Department, located in the Forests Tourist Area. The experiment included three factors: First factor: Seaweed extract (Stimax Nature) applied at three concentrations: 0 ml L ⁻¹ (control), 5 ml L ⁻¹ and 10 ml L ⁻¹ . The extract was sprayed at four growth stages: first stage occurred two weeks after transplanting, and the subsequent three sprays were applied at 14-day intervals. Second factor: Trichoderma fungus (Trichoderma asperellum) applied at three levels: Without fungus (control), 1 g plant ⁻¹and 2 g plant ⁻¹. The fungus was added into the planting hole 10 days before transplanting. The seedlings were then transplanted such that the fungus was positioned beneath the root system of each plant. The fungus was added to the planting hole 10 days before transplanting. Seedlings were then transplanted with the fungus placed beneath the
root system of each plant. Third Factor: Lettuce Cultivars
This factor included two imported lettuce cultivars: Nader *and* Fajer *The experiment included 18 treatments (3×3×2) with three replications conducted as a factorial experiment using a Randomized Complete Block Design (RCBD)***.** *Treatments were randomly distributed according to the experimental design. The results were statistically analyzed according to the adopted design, and means were compared using Duncan's Multiple Range Test at a significance level of 0.05.*
Key words. *Lettuce. Cultivars. Trichoderma. Stimaxs.*

INTRODUCTION

Lettuce (Lactuca sativa L.) is considered one of the most important vegetable crops belonging to the family Compositae, also known as the Sunflower Family (Asteraceae) (Hassan, 2003). The Asteraceae family is one of the largest families in the plant kingdom, comprising about 800 genera and around 20,000 species, most of which are annual herbaceous plants. Lettuce is cultivated for its edible leaves, consumed fresh as a salad crop. It holds significant nutritional and medicinal value, as 100 grams of lettuce leaves contain the following nutritional components: 49 g moisture, 18 calories, 1.3 g protein, 0.3 g fat, 3.5 g carbohydrates, 0.7 g fiber, 0.9 g ash, 68 mg calcium, 25 mg phosphorus, 1.4 mg iron, 9 mg sodium, 264 mg potassium, 11 mg magnesium, 19 IU vitamin A, 0.05 mg thiamine, 0.08 mg riboflavin, 0.4 mg niacin, and 18 mg ascorbic acid (Kim et al., 2016). Its medicinal value lies in the use of its leaves for treating chronic constipation due to their cellulose fiber content, which aids in peristaltic intestinal movement. Additionally, lettuce helps hydrate the body and acts as a diuretic, especially beneficial for individuals with gout and urinary gravel (Al-Qabbani, 1978). Lettuce is also an important source of antioxidants such as phenolics, which protect against cancer and heart diseases. Moreover, it is used in treating skin inflammations and burn pain, where fresh leaves are applied topically as poultices to relieve pain and reduce swelling and inflammation (Lister, 2003). The growth and productivity of this crop are influenced by many factors, including prevailing climatic conditions in the production area and the application of appropriate field practices. Thus, studying these factors is essential to expand lettuce cultivation and enhance yield per unit area by using agricultural techniques and practices that ensure high-quality and high-yield production. Yield improvement can be achieved through several approaches, including the introduction of new imported varieties, the use of seaweed extracts, and the application of biological control agents such as Trichoderma fungi. These are among the important technologies increasingly applied in agriculture to boost production and improve crop quality traits. They also play a role in maintaining ecological balance and enhancing the chemical, biological, and physical properties of the soil, thereby improving plant growth and productivity (Kumar et al., 2014). In a study conducted by Di Mola et al. (2020) on lettuce plants, foliar spraying with seaweed extract Ecklonia maxima at a concentration of 3 ml·L⁻¹ significantly increased the leaf area and marketable yield per unit area compared to untreated plants. Mola et al. (2019) in Portici, southern Italy, applied seaweed extract Kelpak five times at weekly intervals starting three weeks after sowing at concentrations of 0, 1, 2, 3, and 4 ml·L⁻¹. The 4 ml·L⁻¹ treatment significantly improved vegetative growth traits such as plant height, leaf number, dry matter percentage, chlorophyll content, stem weight and length, head circumference and weight, and head compactness compared to the untreated control.Aydin and Demirosy (2020) from Sarayönü University in Turkey applied seaweed extract Vermiwash at concentrations of 0, 1, 2, and 3 ml·L⁻¹ as a single foliar spray two weeks after transplanting. All treatments significantly increased leaf number, stem weight, and head weight compared to the untreated control. Al-Leela et al. (2020) conducted a study in the vegetable field of the Horticulture Department at the University of Mosul using the seaweed extract Algacifo at four concentrations (0, 4, 6, and 8 g·L⁻¹) as a single soil application two weeks after transplanting. The 4 g·L⁻¹ treatment significantly improved head circumference, stem length and weight, leaf number, leaf area, total head weight, total yield, and marketable head weight compared to the other concentrations. In a study by Moncada et al. (2022) in a greenhouse at the Department of Agricultural Sciences, University of Palermo, Italy, lettuce plants were treated once via soil irrigation with seaweed extract Ecklonia maxima at concentrations of 0, 0.5, and 1 g·L⁻¹ two weeks after transplanting. The 1 g·L⁻¹ treatment significantly increased plant height, head circumference, and leaf number compared to other concentrations. Bal and Altintas (2008) in Turkey found that applying Trichoderma fungi at 5, 10, and 15 g·m⁻² to lettuce field soil significantly increased plant height, leaf area, head weight, and yield per unit area, with the highest effects observed at 15 g·m⁻². Di Mola et al. (2020) in Italy applied Trichoderma to the soil surface at three levels (0, 1, and 3 ml·L⁻¹), with both application levels significantly increasing leaf number, head diameter, chlorophyll content, and marketable yield. Lima et al. (2022) in Brazil tested four Trichoderma strains (T. asperelloides, T. asperellum, T. virens, and T. koningiopsis) in soil at a concentration of 1.0×10^7 spores·ml⁻¹. The T. virens strain achieved the highest significant increases in plant height and head weight compared to untreated plants. Fenti and Zegeye (2024) conducted a study in Fogera and Libokemkem regions in northwest Ethiopia on two lettuce cultivars (Tesfa and RSK-3), where the Tesfa cultivar significantly outperformed in head circumference, head diameter, leaf length, total leaf number per plant, and number of marketable leaves. Avdeenko (2022) in Rostov, Russia, studied six lettuce cultivars (Moscow Grand House, Abreak, Yearlash, Blues, Gascony, Sorvanec), finding that Yearlash had the highest total head yield, dry matter percentage, and marketable head yield. Abd Al-Shammari et al. (2021) in Diyala Province tested five lettuce cultivars (Local Romaine, Teresa, Fajer, Nader), where Teresa exhibited the highest chlorophyll content in outer leaves, head circumference, number of outer leaves, total outer leaf area, total plant weight, and head weight. Carini et al. (2020) in Brazil, during a study over three growing seasons on nine lettuce cultivars, found that the Gloriosa cultivar significantly outperformed in the first season in leaf number, dry matter percentage, stem weight and length, and stem diameter. In the second and third seasons, both Gloriosa and Grandes Lagos cultivars led in leaf number and dry matter percentage compared to the other cultivars.

MATERIALS AND METHODS

The experiment was conducted in the vegetable field of the Department of Horticulture and Landscape Engineering, College of Agriculture and Forestry, University of Mosul, located in the Al-Ghabat recreational area in Mosul city. The site is situated at 36.35°N latitude and 43.15°E longitude, at an altitude of 223 meters above sea level, during the 2024–2025 growing season. The soil of the plastic house was prepared by disc plowing, followed by harrowing and leveling using a spike-tooth harrow to achieve a uniform surface. Subsequently, the field was divided into experimental units. The soil was split into three blocks (replicates), and each block was further subdivided into experimental units, each measuring 1.5 m in length and 1 m in width, resulting in a total area of 1.5 m^2 per unit. Each bed contained three planting rows, spaced 35 cm apart, with plants spaced 30 cm within the row, resulting in 15 plants per unit and 54 plants per treatment. A 50 cm buffer zone was left between experimental units to avoid cross-contamination between treatments. Seeds were sown on September 25, 2024, in plastic trays with 50 cells using peat moss as the growing medium. After sowing, a fungicide (Starter 44 EC) was applied at a concentration of 1.5 L⁻¹ as a foliar spray three times to prevent insect and mite infestations. When seedlings reached the three- to four-true-leaf stage, they were transplanted into the plastic house on November 9, 2024, in the morning, with careful handling to keep the peat moss around the roots and maintain adequate soil moisture. The experiment aimed to study the effects of three factors:

1. Seaweed Extract (Stimax Nature) Applied at three concentrations: 0 mL·L⁻¹ (control), 5 mL·L⁻¹ **and** 10 mL·L⁻¹
2.Trichodermafungus (Trichoderma asperellum): Applied at three levels: 0 g·plant⁻¹ (control), 1 g·plant⁻¹ and 2 g·plant⁻¹.
3.Cultivars:
Two imported Romaine lettuce cultivars were used:(Fajer and Nader)
The seaweed extract was sprayed in four growth stages: the first application occurred two weeks after transplanting, and the subsequent three applications were made at 14-day intervals. Trichoderma was applied in the planting hole 10 days before transplanting, placing it directly under the root system of each plant. Due to the factorial combination of the three studied factors (2 cultivars × 3 fungus levels × 3 extract concentrations), the experiment included 18 treatments per replicate, with three replicates in total (54 experimental units, plus control treatments, reaching 60 treatments overall). Treatments were distributed randomly within each replicate using a factorial experiment based on a Randomized Complete Block Design (RCBD). The data were statistically analyzed according to the design used. Mean values were compared using Duncan's Multiple Range Test at a significance level of ≤ 0.05. The statistical analysis was performed using the SAS software (2017). The field experiment was conducted following the RCBD factorial design with three replicates and randomized treatment distribution, according to the methodology described by Al-Rawi and Khalaf Allah (2000).
Measured Parameters
1. **Marketable Head Weight (g·head⁻¹).**
2. **Marketable Yield (kg·m⁻²).**
3. **Head Circumference (cm·head⁻¹).**
4. **Stem Weight (g·stem⁻¹).**

RESULTS AND DISCUSSION:
Marketable Head Weight (g·head⁻¹): Table (1) illustrates that the 5 and 10 mL·L⁻¹ concentrations of the seaweed extract (Stimax Nature) significantly outperformed the 0 mL·L⁻¹ control treatment, which recorded the lowest mean value for marketable head weight (534.89 g·head⁻¹). The highest significant value for this trait (704.61 g·head⁻¹) was obtained using the 10 mL·L⁻¹ concentration of the extract. Regarding the effect of Trichoderma asperellum, both the 1 and 2 g·plant⁻¹ levels recorded significantly higher values for this trait, with mean head weights of 669.72 and 656.83 g·head⁻¹, respectively, compared to the control treatment (0 g·plant⁻¹), which had the lowest value (616.17 g·head⁻¹).As for the lettuce cultivars (Nader and Fajer), no statistically significant differences were observed between them in this particular trait. The interaction between seaweed extract and Trichoderma levels revealed that the highest marketable head weight (761.67 g·head⁻¹) was achieved by combining 10 mL·L⁻¹ of seaweed extract with 1 g·plant⁻¹ of Trichoderma, significantly surpassing all other combinations. In contrast, the lowest value (480.00 g·head⁻¹) was recorded in the control treatment (0 seaweed extract and 0 Trichoderma).The interaction between seaweed extract concentrations and cultivars showed that the combination of 10 mL·L⁻¹ seaweed extract with the Fajer cultivar yielded the highest significant value (725.56 g·head⁻¹), significantly outperforming 50% of the other interaction treatments. The lowest value (537.22 g·head⁻¹) was observed with 0 mL·L⁻¹ seaweed extract and Nader cultivar. Concerning the interaction between Trichoderma levels and cultivars, Nader cultivar combined with 2 g·plant⁻¹ Trichoderma resulted in the highest significant marketable head weight (696.11 g·head⁻¹), significantly higher than all other combinations except for the 1 g·plant⁻¹ Trichoderma with Fajer cultivar. The lowest value (604.56 g·head⁻¹) was recorded with the Nader cultivar and 0 g·plant⁻¹ Trichoderma (control).In the three-way interaction among seaweed extract concentration, Trichoderma level, and cultivar, the highest significant value (833.33 g·head⁻¹) was obtained with the combination of 10 mL·L⁻¹ seaweed extract, 1 g·plant⁻¹ Trichoderma, and the Fajer cultivar, which significantly outperformed all other treatment combinations for this trait. The lowest recorded value (453.33 g·head⁻¹) was found in the treatment involving 0 mL·L⁻¹ seaweed extract, 0 g·plant⁻¹ Trichoderma, and the Nader cultivar.

2. Marketable Head Yield (kg·m⁻²): As shown in Table (2), the 5 and 10 mL·L⁻¹ concentrations of seaweed extract (Stimax Nature) significantly outperformed the 0 mL·L⁻¹ control treatment, which recorded the lowest yield (5.4389 kg·m⁻²) for marketable head yield. The highest significant value (7.0461 kg·m⁻²) was obtained with the 10 mL·L⁻¹ concentration. Regarding the effect of Trichoderma asperellum, both the 1 and 2 g·plant⁻¹ levels significantly exceeded the 0 g·plant⁻¹ control, which had the lowest value

(6.1617 kg·m^{-2}). The highest mean yield (6.6972 kg·m^{-2}) was observed at the 2 g·plant^{-1} level. The data also indicate that there were no significant differences between the two studied lettuce cultivars (Nader and Fajer) for this trait. The interaction between seaweed extract and Trichoderma levels showed that the highest marketable yield (7.6167 kg·m^{-2}) was achieved with the combination of 10 mL·L^{-1} seaweed extract and 1 g·plant^{-1} Trichoderma, which significantly outperformed all other combinations. Conversely, the lowest yield (4.8000 kg·m^{-2}) was recorded in the control treatment (0 mL·L^{-1} seaweed extract + 0 g·plant^{-1} Trichoderma). As for the interaction between seaweed extract concentrations and cultivars, the Fajer cultivar combined with 10 mL·L^{-1} seaweed extract produced the highest yield (7.2556 kg·m^{-2}), significantly surpassing 50% of the other combinations. The lowest value (5.3722 kg·m^{-2}) was obtained from the Nader cultivar with 0 mL·L^{-1} of seaweed extract. The interaction between Trichoderma levels and cultivars led to a significant increase in marketable yield, where Nader cultivar combined with 2 g·plant^{-1} Trichoderma reached the highest yield (6.9611 kg·m^{-2}), significantly outperforming most other combinations. The lowest value (6.0456 kg·m^{-2}) was recorded for the Nader cultivar without Trichoderma (0 g·plant^{-1}). The three-way interaction among seaweed extract, Trichoderma, and cultivars revealed that the highest significant marketable yield (8.3333 kg·m^{-2}) was obtained from the combination of the Fajer cultivar, 10 mL·L^{-1} seaweed extract, and 1 g·plant^{-1} Trichoderma, which significantly outperformed all other combinations. The lowest value (4.5333 kg·m^{-2}) was recorded from the Nader cultivar under 0 mL·L^{-1} seaweed extract and 0 g·plant^{-1} Trichoderma.

3. Head Circumference (cm·head^{-1}): Table (3) shows that no significant differences were observed between the seaweed extract concentrations (0, 5, and 10 mL·L^{-1}) in terms of head circumference. Regarding the effect of Trichoderma asperellum, the data indicate that the 1 g·plant^{-1} treatment significantly outperformed the 0 g·plant^{-1} control, which recorded the lowest head circumference (53.096 cm·head^{-1}). The highest value (56.491 cm·head^{-1}) was recorded with the 1 g·plant^{-1} Trichoderma level. No significant differences were observed between the two lettuce cultivars (Fajer and Nader) for this trait. For the interaction between seaweed extract and Trichoderma levels, all combinations showed significant improvements compared to the control treatment (0 mL·L^{-1} seaweed extract + 0 g·plant^{-1} Trichoderma), which had the lowest head circumference (48.480 cm·head^{-1}). The highest value (57.800 cm·head^{-1}) was recorded when 10 mL·L^{-1} of seaweed extract was combined with 1 g·plant^{-1} of Trichoderma. As for the interaction between seaweed extract and cultivars, the results showed no significant differences in head circumference among the combinations. In the interaction between Trichoderma and cultivars, the Fajer cultivar combined with 1 g·plant^{-1} of Trichoderma produced the largest head circumference (57.992 cm·head^{-1}), significantly surpassing the combinations without Trichoderma in both cultivars, which recorded values of 52.482 and 53.710 cm·head^{-1}, respectively. Regarding the three-way interaction among seaweed extract, Trichoderma, and cultivars, the combination of Fajer cultivar, 1 g·plant^{-1} Trichoderma, and 0 mL·L^{-1} seaweed extract recorded the highest significant value for this trait (59.840 cm·head^{-1}), outperforming most other combinations. The lowest value (48.230 cm·head^{-1}) was observed in the Nader cultivar without seaweed extract or Trichoderma.

4. Stem Weight (g·stem^{-1}): Table (4) shows that no significant differences were observed among the seaweed extract treatments (0, 5, and 10 mL·L^{-1}) in terms of stem weight. Regarding the effect of Trichoderma asperellum, the results indicate that both 1 and 2 g·plant^{-1} significantly outperformed the control treatment (0 g·plant^{-1}), with values of 88.674 and 92.544 g·stem^{-1}, respectively, while the control recorded the lowest value (79.516 g·stem^{-1}). The results also indicate that the Fajer cultivar significantly outperformed the Nader cultivar in stem weight, with values of 92.109 and 81.714 g·stem^{-1}, respectively. In the interaction between seaweed extract and Trichoderma, the highest stem weight (102.942 g·stem^{-1}) was recorded in the 0 mL·L^{-1} seaweed extract + 2 g·plant^{-1} Trichoderma treatment, which significantly outperformed most other combinations. The lowest value for this interaction was 70.275 g·stem^{-1}, observed in the untreated control. As for the interaction between seaweed extract and cultivars, the highest significant value (94.608 g·stem^{-1}) was recorded in the Fajer cultivar combined with 10 mL·L^{-1} of seaweed extract. This treatment significantly outperformed the combinations that recorded the lowest values (74.998 and 83.053 g·stem^{-1}). The interaction between Trichoderma and cultivars showed that the Fajer cultivar combined with 2 g·plant^{-1} of Trichoderma achieved the highest significant stem weight (96.552 g·stem^{-1}), while the lowest value (72.943 g·stem^{-1}) was recorded in the Nader cultivar without Trichoderma. For the three-way interaction between seaweed extract, Trichoderma, and cultivars, the highest stem weight was recorded in the combination of Fajer cultivar, 2 g·plant^{-1} Trichoderma, and no seaweed extract, reaching 109.220 g·stem^{-1}, significantly surpassing most other treatments. The lowest value (63.000 g·stem⁻¹) was recorded in the Nader cultivar without both Trichoderma and seaweed extract.

Seaweed extract concentrations (ml-1)	Trichoderma fungus levels (g)	Cultivars		Seaweed extract X Trichoderma fungus	Average impact of Seaweed extract
		Fajer	Nader		
0	0	506.67 d	453.33 d	480.00 c	543.89 b
	1	496.67 d	523.33 d	510.00 c	
	2	648.33 c	635.00 c	641.67 b	
5	0	685.00 bc	701.00 bc	693.00 b	694.22 a
	1	691.00 bc	706.67 bc	698.83 b	
	2	630.00 c	751.67 b	690.83 b	
10	0	691.67 bc	659.33 bc	675.50 b	704.61 a
	1	833.33 a	690.00 bc	761.67 a	
	2	651.67 c	701.67 bc	676.67 b	
Seaweed extract X Cultivars	0	550.56 c	537.22 c	Average impact of Trichoderma fungus	
	5	668.67 b	719.78 a		
	10	725.56 a	683.67 ab		
Trichoderma fungus X Cultivars	0	627.78 bc	604.56 c	616.17 b	
	1	673.67 ab	640.00 bc	656.83 a	
	2	643.33 bc	696.11 a	669.72 a	
Average impact of cultivars		648.26 a	646.89 a		

Table (1):Effect of foliar application of seaweed extract (Stimax Nature), Trichoderma fungus addition, cultivars, and their interactions on marketable head weight (g•head⁻¹).

Seaweed extract concentrations (ml-1)	Trichoderma fungus levels (g)	Cultivars		Seaweed extract X Trichoderma fungus	Average impact of Seaweed extract
		Fajer	Nader		
0	0	5.0667 d	4.5333 d	4.8000 c	5.4389 b
	1	4.9667 d	5.2333 d	5.1000 c	
	2	6.4833 c	6.3500 c	6.4167 b	
5	0	6.8500 bc	7.0100 bc	6.9300 b	6.9422 a
	1	6.9100 bc	7.0667 bc	6.9883 b	
	2	6.3000 c	7.5167 b	6.9083 b	
10	0	6.9167 bc	6.5933 bc	6.7550 b	7.0461 a
	1	8.3333 a	6.9000 bc	7.6167 a	
	2	6.5167 c	7.0167 bc	6.7667 b	
Seaweed extract X Cultivars	0	5.5056 c	5.3722 c	Average impact of Trichoderma fungus	
	5	6.6867 b	7.1978 a		
	10	7.2556 a	6.8367 ab		
Trichoderma fungus X Cultivars	0	6.2778 bc	6.0456 c	6.1617 b	
	1	6.7367 ab	6.4000 bc	6.5683 a	
	2	6.4333 bc	6.9611 a	6.6972 a	
Average impact of cultivars		6.4826 a	6.4689 a		

*Means that share the same letter for each factor and each interaction are not significantly different from each other according to Duncan's multiple range test at the probability level. (0.05).

Table (2):Effect of foliar application of seaweed extract (Stimax Nature), Trichoderma fungus addition, cultivars, and their interactions on marketable head yield (kg•m⁻²).

*Means that share the same letter for each factor and each interaction are not significantly different from each other according to Duncan's multiple range test at the probability level.(0.05).

Table (3): Effect of foliar application of seaweed extract (Stimax Nature), Trichoderma addition, cultivars, and their interactions on head circumference (cm•head⁻¹).

Seaweed extract concentrations (ml-1)	Trichoderma fungus levels (g)	Cultivars		Seaweed extract X Trichoderma fungus	Average impact of Seaweed extract
		Fajer	Nader		
0	0	48.730 de	48.230 e	48.480 b	54.238 a
	1	59.840 a	53.273 a-e	56.557 a	
	2	57.163 a-c	58.193 a-c	57.678 a	
5	0	55.795 a-c	54.900 a-d	55.348 a	55.086 a
	1	54.807 a-d	56.863 a-c	55.835 a	
	2	52.430 ce	55.720 a-c	54.075 a	
10	0	52.920 b-e	58.000 a-c	55.460 a	55.598 a
	1	59.330 ab	54.830 a-d	57.080 a	
	2	55.565 a-c	52.940 b-e	54.253 a	
Seaweed extract X Cultivars	0	55.244 a	53.232 a	Average impact of Trichoderma fungus	
	5	54.344 a	55.828 a		
	10	55.938 a	55.257 a		
Trichoderma fungus X Cultivars	0	52.482 b	53.710 b	53.096 b	
	1	57.992 a	54.989 ab	56.491 a	
	2	55.053 ab	55.618 ab	55.335 ab	
Average impact of items		55.1756 a	54.7722 a		

***Means that share the same letter for each factor and each interaction are not significantly different from each other according to Duncan's multiple range test at the probability level.(0.05).**

Table (4):Effect of foliar application of seaweed extract (Stimax Nature), Trichoderma addition, cultivars, and their interactions on stem weight (g•stem⁻¹).

Seaweed extract concentrations (ml-1)	Trichoderma fungus levels (g)	Cultivars		Seaweed extract X Trichoderma fungus	Average impact of Seaweed extract
		Fajer	Nader		
0	0	77.550 dg	63.000 g	70.275 d	83.083 a
	1	86.732 b-e	65.330 fg	76.031 CD	
	2	109.220 a	96.663 a-d	102.942 a	
5	0	85.053 c-e	81.000 c-g	83.027 b-d	88.821 a
	1	105.993 ab	96.830 a-d	101.412 a	
	2	80.605 c-g	83.443 cf	82.024 b-d	
10	0	95.665 a-d	74.830 e-g	85.248 bc	88.831 a
	1	88.330 b-e	88.830 b-e	88.580 bc	
	2	99.830 a-c	85.500 ce	92.665 ab	
Seaweed extract X Cultivars	0	91.167 ab	74.998 c	**Average impact of Trichoderma fungus**	
	5	90.551 ab	87.091 ab		
	10	94.608 a	83.053 bc		
Trichoderma fungus X Cultivars	0	86.089 ab	72.943 c	79.516 b	
	1	93.685 ab	83.663 b	88.674 a	
	2	96.552 a	88.536 ab	92.544 a	
Average impact cultivars		92.109 a	81.714 b		

*Means that share the same letter for each factor and each interaction are not significantly different from each other according to Duncan's multiple range test at the probability level.(0.05).

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