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EFFECT OF FOLIAR SPRAY WITH LITHOVIT ON DRY WEIGHT PRODUCTIVITY AND STORABILITY OF TWO GARLIC CULTIVARS

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ABSTRACT: A field experiment was carried out during the two successive winter seasons of 2015 /2016 and 2016/2017 in a Vegetative Private Farm at Hehia Distract, Sharkia Governorate, Egypt, to study the effect of lithovit as foliar application on dry weight, productivity and storability of two garlic cultivars (Balady and Sides 40). The obtained results were as follows: the interaction between Balady cultivar and spraying with lithovit at 5 g/l, increased dry weight of leaves, bulb and leaves + bulb dry weight/plant at 105 and 135 days after planting, and decreased fresh weight loss percentage in bulbs during storage period (180 days from storage) in both seasons. Also, the interaction between Balady cultivar and spraying with lithovit at 3 g/l, increased yield of grades 1, 2 and 3, exportable, marketable and total yield, as well as average bulb weight. On the other hand, Sides 40 cultivar without spraying with lithovit recorded the maximum values in yield of grade 4 in both seasons.

Key words: Garlic, lithovit, cultivars, foliar spray, dry weight, productivity, storability.

INTRODUCTION

Garlic (*Allium sativum* L.) as a member of the Alliaceae family is one of the most important vegetable bulb crops and is next to onion in importance. It is commonly used as a spice and many medicinal purposes. In Egypt, it has been generally cultivated for both local consumption and export. In addition, it is consumed as fresh and dried in the spice form, and as an ingredient to flavour the various dishes all over the world. In Egypt the total cultivated area of garlic, was about 29688 fad., during 2016 season which produced 280216 tons with average of 9.438 tons/faddan.

Nano-fertilizers are used recently as an alternative to conventional fertilizers for slow release and efficient use by plants. Nano-fertilizers could enhance nutrient use efficiency and decrease the costs of environmental protection, (**Naderi and Danesh Shahraki, 2013**). Lithovet compound containing silica (5%), magnesium carbonate (4%) and calcium carbonate (75%) particles, extremely small, which gives them the ability to enter through the stomata in leaves of plants when applied as foliar spray (**Raven, 2003**).

Increasing lithavit rates from zero (untreated) to the highest rate significantly increased plant gridgeth, yield and its components as well as pod and seed quality (**Nassef and Nabeel, 2012** on broccoli; **Byan, 2014** on bean; **Farouk, 2015** on potato; **Abdelghafar *et al.*, 2016** on onion; **Abo-Sedera *et al*., 2016** on snap bean; **Hamoda *et al*., 2016** on cotton; **Abdel Nabi *et al*., 2017** on lettuce; **Abo El-Hamd and Abd Elwahed, 2018** on okra).

The present work aimed to study the effect of lithovit as foliar spraying on gridgeth, yield and storability of some garlic cultivars (Balady and Sides 40) gridgen under clay loam soil conditions.

MATERIALS AND METHODS

A field experiment was carried out during the two successive winter seasons of 2015 /2016 and 2016/2017 in a Vegetative Private Farm at Hehia Distract, Sharkia Governorate, Egypt, to

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study the effect of lithovit treatments (as foliar application) on dry weight, productivity and storability of some garlic cultivars (Balady and Sides 40). Physical and chemical properties of soil during 2015/2016 and 2016/2017 seasons (average two seasons) are shown in Table A.

This experiment was included (8) treatments, which were the combinations between the two garlic cultivars *viz*, Balady and Sides 40 and four rates of lithovit compound as foliar spray (0, 1,3 and 5 g/l).

These treatments were distributed in a split plot design with three replicates, cultivars were randomly arranged in the main plots, while the rates of lithovit were randomly arranged in the sub-plots of the experiment.

The Lithovit was obtained from Agrolink Company as a powder, and chemical analysis of Lithovit were shown in Table B.

The experimental unit area was 12.6 m^2. It contained three ridges with 7 m length and 60 cm in width. One ridge was used for the samples to measure the vegetative gridgeth characters and the other two ridges were used for yield determination.

Garlic cloves were selected for uniformity in shape and size. The cloves were sown at distance of 10 cm apart in the two sides of the ridge. Sowing was done on the first week of October in both gridgeing seasons of the study.

The plants were sprayed with lithovit three times at 60, 75 and 90 days after planting in both seasons.

All plots were received equal amounts of the recommended dose of mineral N, P and K fertilizers as (90, 60 and 72 kg/fad.), respectively in the form of ammonium sulphate (20.6 N%), calcium super phosphate (15.5% P_2O_5) and potassium sulphate (48% K_2O), respectively.

The normal agricultural practices in both experiments were carried out as commonly followed in district under flood irrigation system.

Data Recorded

Dry weight

Two samples each of ten plants were randomly taken from each plot at 105 and 135 days after planting in both seasons of the study to measure the dry weight of garlic plants expressed as follows:

Dry weight

1. Leaves dry weight /plant (g).
2. Bulb dry weight /plant (g).
3. Leaves + bulb dry weight/plant (g).

Yield and its components

At proper maturity stage of bulbs (about 200 days after planting), bulbs in every plot were harvested, then translocated to a shady place on the same day for curing. Plants were placed (about two weeks) in the shady place at 25 ± 5°C and 60-75% relative humidity, and then graded into four categories according to the **Ministry of Economic for garlic exportation (1963)** as follow:

Grade 1: Bulbs with diameter above 5.5 cm

Grade 2: Bulbs with diameter between 4.5-5.5 cm

Grade 3: Bulbs with diameter between 3.5-4.4 cm

Grade 4: Bulbs with diameter less than 3.5 cm

1. Exportable yield (grade 1+grade 2) ton/fad.
2. Marketable yield (grade 1+grade 2+grade 3) ton/fad.
3. Total yield was (grade 1+grade2+grade3 + grade 4) ton/fad.
4. Average bulb fresh weight (g) =

$$\frac{\text{Yield of bulbs /plot}}{\text{Total number of bulbs/plot}}$$

Storability

At harvest time, the yield of each plot was translocated to a shady place for curing and placed two weeks, then tops were removed to obtain uniform bulbs. Samples of cured plants (4 kg from each plot) were put in plastic crates and stored under normal room temperature (25±5°C) and relative humidity (70-75 %) conditions. In

Table A. Physical and chemical properties of the soil during 2015/2016 and 2016/2017 (average of two seasons)

Character	Value
Soil particles distribution	
Sand (%)	23.04
Silt (%)	36.05
Clay (%)	40.91
Texture	Clay loam
Field Capacity (FC) (%)	27.3
$CaCO_3$ (%)	1.10
Organic matter (%)	1.15
pH*	8.10
EC (dSm^{-1})**	1.30
Soluble cations and anions (meq/100 g^{-1})	
Ca^{++}	2.80
Mg^{++}	1.70
Na^{+}	2.15
K^{+}	0.15
CO_3^{--}	0.00
HCO_3^{-}	0.80
Cl^{-}	1.80
SO_4^{--}	4.20
Available nutrients (mg/kg^{-1} soil)	
Available N	80.9
Available P	12.5
Available K	187

* Soil water suspension 1:2.5 ** soil water extract 1:5

Table B. Chemical analysis of lithovit according to Hamoda *et al.* (2016)

Component	Value (%)	Component	Value (%)
Ca CO_3	79.19	SO_4	0.33
N	0.06	Fe	1.31
P_2O_5	0.01	Zn	0.005
K_2O	0.21	Cu	0.002
$MgCO_3$	4.62	Mn	0.014
Selenium dioxide	11.41	NaO	0.55

both seasons the storage zero time was May 7th and the end was November 7th (six month period).

Average room temperature and relative humidity (RH%) during storage months are presented in Table C.

Data were monthly recorded in both seasons of study as follows:

Fresh weight loss percentage (FWL%)

Bulbs of each treatment were weighed at 30 days intervals during six months of storage period and then the cumulative weight loss percentage were calculated.

Fresh weight loss (%) =

$$\frac{\text{Initial weight- weight of bulbs for each sampling date}}{\text{Initial weight of bulbs}}$$

Statistical Analysis

Statistical analysis was conducted for all collected data. The analysis of variance was calculated according to **Snedecor and Cochran (1980)**, and means separation were done according to LSD at 0.05 probability level.

RESULTS AND DISCUSSION

Dry Weight

Effect of cultivars

There were significant differences between the two studied cultivars regarding their different parts of garlic dry weight, *i.e.,* dry weight of leaves, bulb and leaves + bulb dry weight/plant at 105 and 135 days after planting (DAP) in both seasons (Table 1).

Balady cultivar recorded maximum values of dry weight of leaves, bulbs and leaves + bulb dry weight/plant than Sides 40 cultivar at 105 and 135 DAP (days after planting) in both seasons.

The differences between garlic cultivars could be attributed to the genetic differences between cultivars. Differences between garlic cultivars were also observed by **Zaki (1984), Youssef and Tony (2014), Hassan (2015) and Hassan *et al.* (2016)**. They concluded that there were a different characters between the cultivars of garlic.

Effect of lithovit rates

Results in Table 2 show the effect of lithovit rates on dry weight of different parts of garlic in the both seasons.

Spraying garlic plants with lithovit at 5 g/l increased dry weight of leaves, bulbs and leaves + bulb dry weight/plant at 105 and 135 DAP in both seasons. On the other hand, there were no significant differences due to spraying lithovit at 3 and 5 g/l in respect of dry weight of leaves and leaves + bulb dry weight/plant at 105 days after planting in the 1st and 2nd seasons, respectively.

The increase in plant gridgeth in response to lithovit may be due to, its role as a long term reservoir supplying plants with CO_2 (**Bilal, 2010**); thus, it can enhance plant gridgeth and productivity, where elevated CO_2 concentrations generally increased carbon assimilation, biomass and leaf area of plants (**Maswada and Abd El-Rahman, 2014**). It is well known that lithovit particles remain as a thin layer on the surface of leaves and penetrate frequently when they get wet with dew at night. Lithovit also contains nano-Mg, where magnesium is an essential nutrient for plant gridgeth and plays an important role in many plant physiological processes, such as photosynthesis (Mg is the central element of the chlorophyll molecule), sugar synthesis, starch translocation, control of nutrient uptake. It also works as an enzyme activator, a constituent of many enzymes and a carrier of phosphorus in the plant (**Allison *et al*., 2001**).

These results are in harmony with these reported by **Farouk (2015)** on potato, **Abo-Sedera *et al.* (2016)** on snap bean, **Abdel Nabi *et al.* (2017)** on lettuce and **Abo El-Hamd and Abd Elwahed (2018)** on okra. They found that sprayed plants with lithovit gave the highest values of dry weight of these different plants than unsprayed plants.

Effect of the interaction between cultivars and lithovit rates

The interaction between cultivars and lithovit at different rates had significant effect on the dry weight of different parts of garlic at 105 and 135 DAP in both seasons (Tables 3 and 4).

Table C. Average room temperature (°C) and relative humidity (%) during storage months in the two seasons

Month	Temperature (°C)	Relative humidity (%)
	2016	2017
May	25.42	8814
June	27.09	88.85
July	28.41	87.45
August	30.19	87.21
September	28.22	89.14
October	25.14	84.25
November	25.14	85.47

Table 1. Effect of cultivars on dry weight of different plant parts of garlic at 105 and 105 days from planting during 2015/2016 and 2016/2017 seasons

Treatment	Dry weight of leaves/plant (g)		Dry weight of bulb/plant (g)		Leaves + bulb dry weight/plant (g)	
	Days after planting					
	105	135	105	135	105	135
Cultivar			2015/2016 season			
Balady	9.01	15.36	5.01	10.44	14.02	25.80
Sides 40	7.62	12.11	2.95	9.61	10.58	21.81
LSD (0.05)	0.89	0.49	0.33	0.70	1.15	1.11
			2016/2017 season			
Balady	9.21	16.51	5.46	11.00	14.67	27.51
Sides 40	7.50	13.48	3.29	10.16	10.79	23.65
LSD (0.05)	NS	0.37	0.31	0.53	1.86	0.88

Table 2. Effect of lithovit rates on dry weight of different plant parts of garlic at 105 and 135 days from planting during 2015/2016 and 2016/2017 seasons

Treatment	Dry weight of leaves/plant (g)		Dry weight of bulb/plant (g)		Leaves + bulb dry weight/plant (g)	
	Days after planting					
	105	135	105	135	105	135
Lithovit rates			**2015/2016 season**			
0 (control)	6.86	11.01	2.94	7.09	9.81	18.27
1g/l	7.67	12.65	3.39	9.15	11.07	21.80
3g/l	9.17	14.73	4.45	11.17	13.63	25.90
5g/l	9.55	16.56	5.14	12.69	14.69	29.25
LSD (0.05)	0.57	0.35	0.12	0.60	0.63	0.70
			2016/2017 season			
0 (control)	6.94	12.92	3.21	7.53	10.15	20.45
1g/l	8.04	14.59	3.98	9.65	12.02	24.24
3g/l	9.22	15.79	4.89	11.69	14.11	27.48
5g/l	9.55	16.69	5.41	13.45	14.63	30.14
LSD (0.05)	0.50	0.26	0.22	0.67	0.59	0.71

Table 3. Effect of the interaction between cultivars and lithovit rates on dry weight of different plant parts of garlic at 105 and 135 days from planting during 2015/2016 season

Treatment		Dry weight of leaves/plant (g)		Dry weight of bulb/plant (g)		Leaves + bulb dry weight/plant (g)	
		Days after planting					
Cultivar	**Lithovit**	**105**	**135**	**105**	**135**	**105**	**135**
Balady	**0 (control)**	7.62	12.02	3.67	8.09	11.30	20.11
	1 g/l	8.43	14.32	4.27	9.25	12.70	23.57
	3 g/l	9.89	17.08	5.96	11.13	15.85	28.21
	5 g/l	10.09	18.02	6.14	13.30	16.23	31.32
Sides 40	**0 (control)**	6.10	10.00	2.22	6.09	8.32	16.42
	1 g/l	6.92	10.99	2.51	9.05	9.43	20.04
	3 g/l	8.46	12.38	2.95	11.21	11.42	23.59
	5 g/l	9.02	15.10	4.13	12.08	13.15	27.18
LSD (0.05)		0.80	0.50	0.17	085	0.90	0.90

Table 4. Effect of the interaction between cultivars and lithovit rates on dry weight of different parts of garlic at 105 and 135 days from planting during 2016/2017 season

Treatment		Dry weight of leaves/plant (g)		Dry weight of bulb/plant (g)		Leaves + bulb dry weight/plant (g)	
		Days after planting					
Cultivar	Lithovit	105	135	105	135	105	135
Balady	0 (control)	7.75	14.24	4.03	8.44	11.78	22.68
	1 g/l	9.18	16.42	5.07	9.97	14.25	26.38
	3 g/l	9.92	17.12	6.10	11.82	16.02	28.94
	5 g/l	10.00	18.26	6.64	13.77	16.64	32.03
Sides 40	0 (control)	6.13	11.60	2.40	6.63	8.53	18.23
	1 g/l	6.90	12.76	2.90	9.33	9.80	22.09
	3 g/l	8.52	14.46	3.68	11.56	12.20	26.02
	5 g/l	8.45	15.12	4.18	13.13	12.63	28.25
LSD (0.05)		0.70	0.37	0.31	0.95	0.84	1.00

The interaction between Balady cultivar and spraying with lithovit at 5g/l increased the dry weight of leaves, bulb and total dry weight of whole plant at 105 and 135 DAP in both seasons in most casses, followed by the interaction between Balady cultivar and lithovit at 3 g/l.

Yield and its Components

Effect of cultivars

Results in Table 5 indicate that Balady cultivar gave the high values of yield of grades 1, 2 and 3, exportable, marketable and total yield, as well as average bulb weight, except, yield of grade 1 in the 1st season, whereas Sides 40 cultivar increased yield of grade 4.

These results are in agreement with those reported by **Fattahallah *et al*. (1992), Osman *et al*. (1996)**, **Abdalla *et al.* (2011), Mohsen (2012), Abdel-Razzak and El-Sharkawy, (2013) and Abo El-Fadel and Mohamed (2013)** who found that the Balady garlic cultivar gave higher total yield and its components of bulbs, than other cultivars.

Effect of lithovit rates

The obtained results in Table 6 indicate that spraying garlic plants with lithovit at 5 g/l, increased yield of grades 1, 2 and 3, exportable, marketable and total yield, as well as average bulb weight, with no significant differences with lithovit at 3 g/l as respect to yield of grade 1 and 2 in both seasons and exportable, marketable and total yield, as well as average bulb weight in the 1st season. The control treatment (unsprayed plants) recorded the highest yield of grad 4 in this respect.

Lithovit contains nano-Iron which is one of the essential elements for plant gridgeth and plays an important role in the photosynthetic reactions. Iron activates several enzymes and contributes to RNA synthesis and improves the performance of photosystems, and then increased plant gridgeth and total yield (**Zaki, 1984; Malakouti and Tehrani, 2005; Abou El-Magd *et al*., 2014; Youssef and Tony, 2014; Hassan, 2015; Hassan *et al.*, 2016**).

Similar findings were also obtained by **Byan (2014)** on snap bean, **Farouk (2015)** on potato and **Abo El-Hamd and Abd Elwahed (2018)** on okra. They found that plants sprayed with lithovit at 0.75 g/l, recoded the maximum values of pod parameters, such as length, diameter and weight, as well as, yield and its components *i.e.,* total yield, weight and number of pods/plant were increased compared to the unsprayed plants.

Table 5. Effect of cultivars on yield and its components of garlic during 2015/2016 and 2016/2017 seasons

Treatment	Yield and its components (ton/fad.)							Average bulb weight (g)
	Grade 1	Grade 2	Grade 3	Grade 4	Exportable yield	Marketable yield	Total yield	
Cultivar				**2015/2016 season**				
Balady	2.326	2.982	1.756	0.532	5.308	7.065	7.597	68.26
Sides 40	1.869	2.271	1.406	0.695	4.140	5.547	6.243	61.70
LSD (0.05)	NS	0.195	0.158	0.017	0.594	0.751	0.757	1.59
				2016/2017 season				
Balady	2.426	3.150	1.405	0.528	5.576	6.982	7.511	75.48
Sides 40	1.894	2.404	1.082	0.626	4.299	5.381	6.008	63.54
LSD (0.05)	0.124	0.186	0.035	0.062	0.310	0.312	0.251	2.22

Table 6. Effect of lithovit rates on yield and its components of garlic during 2015/2016 and 2016/2017 seasons

Treatment	Yield and its components (ton/fad.)							Average bulb weight (g)
	Grade 1	Grade 2	Grade 3	Grade 4	Exportable yield	Marketable yield	Total yield	
Lithovit rate				**2015/2016 season**				
0 (control)	1.679	1.983	1.075	0.968	3.662	4.737	5.706	57.24
1g/l	1.874	2.411	1.550	0.665	4.286	5.836	6.502	62.88
3g/l	2.385	3.010	1.774	0.457	5.395	7.169	7.627	68.69
5g/l	2.452	3.101	1.927	0.365	5.553	7.480	7.845	71.12
LSD (0.05)	0.274	0.257	0.164	0.096	0.390	0.474	0.486	1.14
				2016/2017 season				
0 (control)	1.771	2.004	1.041	0.813	3.776	4.817	5.630	60.33
1g/l	1.961	2.441	1.244	0.596	4.402	5.647	6.243	66.90
3g/l	2.368	3.228	1.269	0.510	5.596	6.865	7.376	74.03
5g/l	2.541	3.435	1.421	0.391	5.976	7.397	7.788	76.78
LSD (0.05)	0.088	0.133	0.036	0.044	0.222	0.246	0.254	1.64

Effect of interaction between cultivars and lithovit rates

Results in Tables 7 and 8 show that the interaction between Balady cultivar and spraying plants with lithovit at 3 g/l increased yield of grades 1, 2 and 3, exportable, marketable and total yield, as well as average bulb weight with no significant differences with the interaction between Balady cultivar and lithovit at 5 g/l in both seasons. On the other hand, Sides 40 cultivar without spraying with lithovit recorded the maximum value of yield of grade 4, in both seasons.

Storability

Effect of cultivars

Fresh weight loss percentage (FWL%) in bulb increased with prolonging storage period up to 180 days of storage (Table 9). Balady cultivar recorded lower FWL(%) during storage periods compared to Sides 40 cultivar.

The obtained results are in harmony with those reported by **Ammar (2007), Abdel-Razzak and El-Sharkawy (2013) and Hassan *et al.* (2016)** on garlic. They found that Balady cultivar gave the lowest value of total weight loss (%) at the end of storage under temperature room than Sids 40 cultivar.

Effect of lithovit rates

Fresh weight loss (%) significantly decreased with increasing lithovit up to 3 or 5 g/l during storage period up to 180 days (Table 10). This mean that lithovit at 5 g/l recorded the lowest values of FWL (%) in most period, in both seasons, whereas, the control treatment (unsprayed) recorded the highest value of FWL (%) in bulbs.

Effect of the interaction between cultivars and lithovit rates

Results in Tables 11 and 12 illustrate that, in general, the interaction between Balady cultivar and spraying with lithovit at 5 g/l gave the lowest values of FWL (%) in bulbs during storage periods, whereas, the interaction between Sides 40 cultivars and control treatment (unsprayed) gave the highest values of FWL (%) during storage periods.

Conclusively, it could be concluded that, the best interaction treatment for enhancing yield and storability were recorded by the interaction between Balady cultivar and sprayed garlic plants with lithovit at 5 g/liter under the same conditions of this study.

Table 7. Effect of the interaction between cultivars and lithovit rates on yield and its components of garlic during 2015/2016 season

Treatment		Yield and its components (ton/fad.)							Average bulb weight (g)
Cvs	Lithovit rates	Grade 1	Grade 2	Grade 3	Grade 4	Exportable yield	Marketable yield	Total yield	
Balady	**0 (control)**	1.946	2.397	1.305	0.964	4.344	5.649	6.614	62.62
	1 g/l	2.210	2.821	1.812	0.447	5.032	6.844	7.291	65.06
	3 g/l	2.669	3.356	1.904	0.365	6.025	7.929	8.294	71.68
	5 g/l	2.480	3.353	2.005	0.353	5.833	7.838	8.192	73.71
Sides 40	**0 (control)**	1.412	1.569	0.845	0.972	2.981	3.826	4.798	51.86
	1 g/l	1.538	2.002	1.288	0.884	3.540	4.829	5.714	60.70
	3 g/l	2.102	2.664	1.644	0.549	4.766	6.410	6.960	65.71
	5 g/l	2.424	2.849	1.849	0.376	5.273	7.123	7.499	68.54
LSD (0.05)		0.387	0.364	0.232	0.137	0.551	0.670	0.686	1.61

Table 8. Effect of the interaction between cultivars and lithovit rates on yield and its components of garlic during 2016/2017 season

Treatment		Yield and its components (ton/fad.)							Average bulb weight (g)
Cvs	Lithovit rates	Grade 1	Grade 2	Grade 3	Grade 4	Exportable yield	Marketable yield	Total yield	
Balady	**0 (control)**	1.980	2.470	1.185	0.786	4.450	6.555	6.421	68.80
	1 g/l	2.139	2.980	1.436	0.467	5.119	6.836	7.022	75.24
	3 g/l	2.757	3.620	1.404	0.440	6.377	7.781	8.221	78.09
	5 g/l	2.830	3.530	1.598	0.422	6.360	7.958	8.380	79.79
Sides 40	**0 (control)**	1.563	1.539	0.898	0.840	3.102	4.000	4.840	51.86
	1 g/l	1.784	1.902	1.053	0.726	3.686	4.739	5.465	58.56
	3 g/l	1.980	2.836	1.134	0.581	4.816	5.635	6.531	69.98
	5 g/l	2.252	3.340	1.244 c	0.360	5.592	5.950	7.196	73.77
LSD (0.05)		0.125	0.188	0.051	0.62	0.314	0.348	0.359	2.32

Table 9. Effect of cultivars on fresh weight loss percentage of garlic bulbs during storage period in 2015/2016 and 2016/2017 seasons

Treatment	Days after storage					
	30	**60**	**90**	**120**	**150**	**180**
Cultivar			**2015/2016 season**			
Balady	4.09	7.86	10.73	13.92	18.24	20.46
Sides 40	8.58	11.08	13.21	19.97	22.02	25.52
LSD (0.05)	1.37	2.19	2.46	1.89	2.08	2.71
			2016/2017 season			
Balady	3.59	6.63	9.84	13.09	16.65	18.78
Sides 40	8.07	9.92	11.91	18.02	19.95	23.24
LSD (0.05)	1.79	1.46	1.42	2.14	1.89	2.01

Table 10. Effect of lithovit rates on fresh weight loss percentage of garlic bulbs during storage period in 2015/2016 and 2016/2017 seasons

Treatment	Days after storage					
	30	60	90	120	150	180
Lithovit rate	**2015/2016 season**					
0 (control)	7.45	9.86	13.53	18.55	21.63	25.61
1 g/l	6.17	9.28	12.30	18.14	21.59	24.25
3 g/l	5.63	9.17	11.06	15.93	18.06	20.46
5 g/l	6.09	9.57	10.99	15.18	19.25	21.65
LSD (0.05)	NS	NS	1.83	1.61	1.27	1.88
	2016/2017 season					
0 (control)	7.00	10.27	12.72	17.44	20.33	24.08
1 g/l	5.80	9.23	11.56	16.55	19.80	22.79
3 g/l	5.29	7.12	9.89	14.98	16.98	19.23
5 g/l	5.23	6.50	9.33	13.27	16.10	17.95
LSD (0.05)	0.83	1.10	1.27	1.48	1.24	1.59

Table 11. Effect of the interaction between cultivars and lithovit rates on fresh weight loss percentage of garlic bulbs during storage period in 2015/2016 season

Treatment		Days after storage					
		30	60	90	120	150	180
Cvs	**Lithovit rates**						
Balady	**0 (control)**	5.36	7.13	12.24	15.18	19.50	22.50
	1 g/l	3.36	6.33	10.36	14.80	18.97	21.54
	3 g/l	3.28	8.81	10.76	13.46	16.79	18.83
	5 g/l	4.34	9.15	9.55	12.25	17.71	18.97
Sides 40	**0 (control)**	9.53	12.58	14.81	21.91	23.75	28.72
	1 g/l	8.98	12.23	14.23	21.47	24.21	26.95
	3 g/l	7.98	9.52	11.35	18.40	19.33	22.08
	5 g/l	7.84	9.99	12.43	18.10	20.79	24.32
LSD (0.05)		1.49	2.36	2.59	2.28	1.79	2.66

Table 12. Effect of the interaction between cultivars and lithovit rates on fresh weight loss percentage of garlic bulbs during storage period in 2016/2017 seasons

Treatment		Days after storage					
		30	60	90	120	150	180
Cvs	Lithovit rates						
Balady	**0 (control)**	5.04	8.70	11.51	14.27	18.33	21.15
	1 g/l	3.16	6.95	9.74	13.91	17.83	20.25
	3 g/l	3.08	5.28	9.11	12.65	15.78	17.70
	5 g/l	3.08	5.60	8.98	11.52	14.65	16.03
Sides 40	**0 (control)**	8.96	11.83	13.92	20.60	22.33	27.00
	1 g/l	8.44	11.50	13.38	19.18	21.76	25.33
	3 g/l	7.50	8.95	10.67	17.30	18.17	20.76
	5 g/l	7.37	7.39	9.68	15.01	17.54	19.86
LSD (0.05)		1.17	1.56	1.79	2.09	1.76	2.25

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تأثير الرش الورقي بالليثوفيت على الوزن الجاف، الإنتاجية والقدرة التخزينية لصنفين من الثوم

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أُجريت تجربة حقلية خلال شتاء موسمى ٢٠١٥/٢٠١٦، ٢٠١٦/٢٠١٧ بمزرعة خضر خاصة بمنطقة ههيا، محافظة الشرقية، مصر بهدف دراسة تأثير الرش الورقى بالليثوفيت على الوزن الجاف والإنتاجية والقدرة التخزينية لصنفى الثوم البلدى وسدس ٤٠، وكانت أهم النتائج المتحصل عليها هى: أدت معاملة التفاعل بين الصنف البلدى ومعاملة الرش بالليثوفيت بمعدل ٥ جم/لتر إلى زيادة كل من الوزن الجاف للأوراق، البصلة، الوزن الجاف للأوراق والبصلة، وذلك عند ١٠٥، ١٣٥ يوم من الزراعة، كما أدت إلى انخفاض للفقد فى الوزن الجاف فى الأبصال أثناء فترة التخزين (١٨٠ يوم من التخزين) فى كلا الموسمين، وأدى التفاعل بين الصنف البلدى ومعاملة الرش بالليثوفيت بمعدل ٣ جم/لتر إلى زيادة كل من محصول الدرجة الأولى والثانية والثالثة، المحصول القابل للتصدير والقابل للتسويق والمحصول الكلى وكذلك متوسط وزن راس الثوم، ومن ناحية أخرى فقد سجلت معاملة التفاعل بين الصنف سدس ٤٠ وبدون رش بالليثوفيت إلى الحصول على أعلى القيم لمحصول الدرجة الرابعة فى كلا الموسمين.

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