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Impact of Pre-Storage Seed Treatments, Packing Materials and Storage Periods on Onion Seed Quality

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ABSTRACT

Onion seed cv. Giza 6 " Improved " was treated with priming in salicylic acid, fungicide vitavax and salicylic acid + fungicide vitavax before packing in cloth, aluminum foil and polyethylene bags for 0, 3, 6, 9 and 12 month, after treatment. Seed moisture content %, germination %, seed and seedling vigor traits and fungi infestation% were recorded after each storage period. Seed treatments maintained onion seed quality as measured by; seed germination%, tetrazolium test, seed vigor (germination% after accelerated aging test and electrical conductivity, seedling vigor (seedling length and seedling dry weight) and fungi infection% comparing untreated seeds. Type of seed packing materials significantly affected seed moisture content and quality traits of onion seed. Aluminum foil and polyethylene bags maintained onion seed at low moisture content, fungi infestation, high seed and seedling vigor comparing cloth bags. Prolong storage periods from 0 to 3, 6, 9 and 12 months decreased germination%, viable seed, accelerated aging test%, seedling vigor traits and fungi infestation%. Treating onion seed by salicylic acid solution, fungicide vitavax and salicylic acid solution+ fungicide vitavax before storage in aluminum foil or polyethylene bag maintained onion seed germination %, seed and seedling vigor comparing untreated seed stored in cloth bags. This study suggested that, onion seed should be treated by fungicide vitavax before storage in aluminum foil to maintain onion seed quality during storage and get high field emergence.

INTRODUCTION

Onion *(Allium cepa* L.*)* seed is one of the short-lived seeds, where it loses its viability and vigor after harvesting more rapidly than seeds of the other crops unless special precautions are taken in its storage (Amjad and Anjum, 2002 and Khan *et al.,* 2004). It is therefore generally recommended that only fresh onion seed should be used for crop production (Riekels *et al.,*1976), and only seed of high germination percentage should be sold. Moreover, many onion seed sellers mixed the new seeds by the old one to attain large profits. This procedure result in decreasing transplants required in the field. On the other side, with prolong the storage period especially in natural environments under tropical and subtropical areas like Egypt, seed deterioration increased and leads to several changes like decline in enzyme activities, membrane degradation, increasing respiration rate, and decreasing seed germination, seed and seedling vigor (Mersal *et al.,* 2006 and Malaker *et al.,* 2008).

In order to decrease seed deterioration during storage, several methods are being adopted such as; seed treatment with suitable pesticides or seed priming before storage in safe containers for the optimal period. Fungicide seed treatment is an importance technique and recommended for controlling the fungi associated with the seeds of various species in order to improve their performance by developing more vigorous and healthy seedlings. Gupta *et al.* (1989) reported that seed treatment with fungicides is found to be more useful in storage for maintaining better seed quality up to one year in onion by suppressing the storage pests and fungi. Santavec and Kocjan Acko (2011) found that wheat seed treatment with fungicides Maxim 050 FS and Vitavax 200-FF had significantly improved the health status (2% infected grains) compared to untreated processed seed (25% infected grains).

But, using chemical pesticides and their residual toxicity adversely affect environmental contamination, human and animals health besides, affecting seed quality. So, many studies worked on using other alternatives in place of chemical pesticides like antioxidants. Salicylic acid is one of antioxidants, it is considered to be effective plant hormone (Raskin, 1992) because of its diverse regulatory roles in plant metabolism (Popova *et al.,* 1997).

Pre-treatment with salicylic acid or its analogues was found to affect germination where enhanced seed germination (Rajasekaran *et al.,*2002 and Korkmaz, 2005). Seed can be treated by several methods as seed coating, pelting, soaking and priming. Seed priming defined as a pretreatment of seeds by various methods in order to improve seed germination rate, germination percentage, and improve uniformity of seedling emergence by controlling the water available in the seed, initiates the early stages of germination, but does not permit radicle protrusion, and then the seeds are dried until needed where, series of biochemical and physiological activities occur during this plateau phase, there by improving the subsequent germination (McDonald, 2000 and Farooq *et al.,*2006). Handling of primed seeds in a dry state have practical advantages for growers, however there are limited reports on the effects of extended storage period of dried primed seeds on their germination and vigour. Drew *et al.* (1997) observed that primed onion and leek seeds stored at 10°C, maintained viability after one year of storage. Brocklehurst and Dearman (1983) concluded that drying back the primed seed had no effect on germination percentage.

The extent of storage period influenced by type of packing materials. Seed containers divided to vapor-proof bags, which can be used with low-moisture content, where seed maintains their low moisture content and can maintain viability longer under good ambient storage conditions and non-vapor proof bags these packages prevent moisture-vapor exchange between the inside and outside of the bag. The most common bag materials are; paper bags, cotton bags, metal cans, glass bottles, laminated aluminum foil and polyethylene bags. Kuppusamy and Ranganathan (2014), primed seeds can safely be dried back to original moisture content and stored in sealed aluminum foil pouches to harness maximum efficiency of priming treatments and better storability.

So, the aim of the present study was to improve onion seed performance under laboratory conditions

through seed priming and fungicide treatments before packing in suitable material for different storage periods.

MATERIALS AND METHODS

This experiment was conducted at Seed Technology Research Department, Field Crops Research Institute, ARC, Egypt from 2015 to 2016 years to study the effect of some seed treatments and packing materials on onion seed quality after different storage periods. Factorial experiment in Randomized Complete Design (RCD) with four replicates was used. Onion seeds c.v. Giza 6 " Improved" were obtained from Onion Research Department, Field Crops Research Institute, ARC.

The studied factors

A-Seed treatments

1- **Seed priming:** Onion seeds were placed in beakers 2 liter contains 500 ml of salicylic acid solution (150 ppm) for 3 hours at 20°C and aeration was provided by the use of aquarium air pumps. The beakers were covered with aluminum foil to avoid evaporation. After soaking, onion seeds were back dried to the original weight with forced air under shade (Villella and Beckert, 2001) and seed moisture content was determined and it was 8.4% ± 2.

2- **Fungicide vitavax:** Onion seeds were treated with the recommended dose (2g/kg) of vitavax, it back dried for the original moisture content before packing.

3- **Seed priming in salicylic acid + fungicide vitavax:** Onion seeds were subjected to double treatment *i.e.* priming in salicylic acid (150 ppm) and fungicide vitavax (2g/kg) and it back dried for the original moisture content before packing.

B- Packing materials: After each treatment onion seeds were packed in the tested packing materials (cloth bags, aluminum foil bags and polyethylene bags).

C- Storage periods: After packing, treated seeds were stored for (0, 3, 6, 9 and 12 months) after treatment.

Studied characters

Seed moisture content (%): Seed moisture content of onion seed was determined after each storage period according to ISTA (1999).

Germination test: Germination test was performed according to International Seed Testing Association (ISTA, 1999). Random sample of 200 seeds were taken from each treatment and divided to four replicates and germinated under laboratory conditions at 20 ± 2ºC on filter paper in sterilized Petri dishes (15 cm) for 10 days to estimate the following parameters:

Germination percentage (%): It defined as the total number of normal seedlings at the end of the test after 10 days from sowing.

$$\text{Germination percentage} = \frac{\text{No.of normal seedlings}}{\text{No.of sowing seeds}} \text{ x } 100$$

Germination rate: Germination rate was determined according to the procedure reported by Bartleltt (1937).

$$\text{Germination rate} = \frac{a+(a+b)+(a+b+c)+.....+(a+b+c+m)}{n(a+b+c+.....+m)}$$

Where: a, b, c, m, Number of seedlings emerged at the first, second, third and final count, respectively and (n) is the number of counts.

Tetrazolium test (TZ%)

Random sample of 10 seeds in four replicates were soaked for 12 hours in distilled water, then onion seeds were cut after that, it was soaked in tetrazolium salt solution 1% for 3 hours in incubator at 30°C before evaluation where, the completely stained embryos with red color were recorded as viable seed (ISTA, 1999).

Accelerated Aging Test % (AAT): Accelerated aging test was performed according to (ISTA, 1999).

Electrical conductivity (*mmhos/gm/seed*)

Electrical conductivity test was carried out using four replicates of 50 seeds from each treatment, which were weighed and soaked in beakers containing 125 ml deionized water for 24 hours at 20ºC (Matthews and Alison, 1987).

Seedling length and seedling dry weight

During the final count, ten normal seedlings from each replicate were taken randomly to measure the seedling length in cm. Then, the ten seedlings were dried in a forced air oven at 105°C for 24 hours and weights thereafter. Dry weight recorded and expressed in grams, (Krishnasamy and Seshu, 1990).

Fungi infection percentage (%)

Fungi infection percentages of onion seed were carried out using the standard blotter method as described by (ISTA, 1999).

Collected data were subjected to the statistical analysis as a usual technique of analysis of variance (ANOVA) for the Factorial experiment in Completely Randomized Design as mentioned by Gomez and Gomez (1984) using "MSTAT-C" Computer software package. The treatment means were compared by using the least significant of difference (LSD) method.

RESULTS AND DISCUSSION

Treating onion seeds with the tested materials *i.e.* salicylic acid, fungicide vitavax and salicylic acid + vitavax led to high significant effects on seed moisture content %, germination%, traits of seed and seedling vigor as well as fungi infestation % comparing untreated seed (Table 1). Seed treatments differed in its effects on onion seed moisture content where untreated seed had the highest percentage of moisture content, mean while, the lowest % of seed moisture content was recorded from treated seed with vitavax. Treated seed with fungicide vitavax produced the highest readings of seed quality traits followed by treated seed with salicylic acid + vitavax and finally treated seed with salicylic acid only where, germination % increased to (74%), percentage of red colored seed in TZ test (viable seed) increased to (79%), germination % after AAT increased to (72%) ,whereas electrical conductivity reading of leached seed decreased to (0.378 *mmhos/g/seed*) comparing to (0.383 *mmhos/g/seed*) for control. Seedling vigor traits, *i.e.* seedling length and seedling dry weight reached its highest means when onion seed primed in salicylic acid solution, these results in harmony with, Rajasekaran *et al.,* (2002). It is noticed that germination rate of onion seed which treated with fungicide vitavax decreased to 0.679 comparing 0.706 for treated seed with salicylic acid + vitavax.

Treated seed with vitavax after salicylic acid had the lowest percentage of fungi infestation (4.18%), followed by treated seed by SA+vitavax (7.17%) meanwhile, it reached its highest percentage (22.42%) in untreated seed (control). Seed treatment with vitavax helped as fungicide against storage fungus and also acted as barrier for moisture entry. Seeds treated with vitavax recorded higher germination, seed and seedling vigor traits might have played significant role in growth inhibition of storage fungi and attributed to higher germination and seed quality traits, this is in accordance with the findings (Singh *et al.,*1996).

Table 1. Effect of seed treatments, packing materials and storage periods on seed moisture content%, germination%, tetrazolium test%, accelerated aging test%, electrical conductivity, germination rate, seedling length, seedling dry weight and fungi infection % of onion seed.

Treatments		Moisture content %	Germination %	Tetrazolium test %	Accelerated aging test%	Electrical conductivity */mmhos /gm/seed*	Germination rate	Seedling length (cm)	Seedling dry weight (mg)	Fungi Infection %
A:Seed treatments:										
Control		8.62	69	73	60	0.383	0.681	11.4	13.64	22.42
Salicylic acid		8.58	71	76	64	0.380	0.698	11.7	14.33	12.48
Vitavax		8.48	74	79	72	0.378	0.679	11.4	14.09	4.18
Salicylic acid + Vitavax		8.60	72	78	67	0.379	0.706	11.6	14.31	7.17
LSD at	0.05%	0.08	0.5	0.3	0.7	0.001	0.012	0.2	0.09	0.46
	0.01%	0.11	0.6	0.4	0.9	0.002	0.015	--	0.11	0.60
B: Packing materials:										
Cloth bag		9.39	67	73	65	0.388	0.676	11.3	13.83	14.88
Aluminum bag		8.10	75	79	67	0.374	0.716	11.7	14.39	9.59
Polyethylene		8.23	73	78	66	0.379	0.681	11.6	14.06	10.19
LSD at	0.05%	0.07	0.4	0.3	0.6	0.001	0.010	0.2	0.07	0.40
	0.01%	0.09	0.5	0.4	0.8	0.002	0.013	0.3	0.10	0.52
C: Storage period (month):										
0		8.40	95	97	84	0.183	0.852	12.7	18.85	17.13
3		8.60	85	89	80	0.209	0.816	12.4	16.83	11.66
6		8.53	72	80	69	0.258	0.761	12.1	13.68	10.52
9		8.63	56	62	63	0.571	0.578	11.2	11.87	9.59
12		8.69	49	54	34	0.680	0.449	9.3	9.24	8.86
LSD at	0.05%	0.09	0.5	0.3	0.7	0.001	0.013	0.2	0.05	0.51
	0.01%	0.12	0.7	0.5	1.0	0.002	0.017	0.3	0.07	0.67

Type of seed packing materials had high significant effect on seed moisture content and seed quality traits (Table 1). Storage onion seed in aluminum bag maintained onion seed quality comparing polyethylene bags and cloth bags. Stored seed in cloth bags had the highest mean of seed moisture content (9.39%) whereas, stored seed in aluminum bags contains the lowest moisture % (8.10%). Stored seed in aluminum bags produced the highest percentage of germination (75%) comparing 67% for cloth bags. Also traits of TZ, AAT, germination rate, seedling length and seedling dry weight reached its highest values when onion seed stored in aluminum bags, followed by stored seed in polyethylene bags and cloth bags. Packed seed in cloth bags recorded lower germination and seed quality traits compared to aluminum foil and polyethylene bags which recorded higher germination, seed and seedling vigor traits and fungi infection. This is mainly as a result of maintenance of lower moisture content during the storage period. Fungi infestation % of stored seed aluminum bags was the lowest comparing stored seed in cloth bags. Reading of electrical conductivity of stored seed in aluminum bags reached its lowest mean (0.374*mmhos/g/seed*) comparing (0.388 *mmhos/g/seed*) for stored seed in cloth bags where aluminum and polyethylene bags recorded lowest electrical conductivity of seed leachate mainly due to lower moisture content maintained. Aluminum and polyethylene bags acted as moisture proof barriers. Lower seed moisture content resulted in lower respiration rate, lower metabolic activity and maintenance of higher seed vigour during storage (Saxena *et al*., 1987).

From data in Table 1, prolong storage period led to high significant variation in seed moisture content during the different storage periods, decrease in seed germination, traits of seed and seedling vigor and storage fungi infestation%. Increasing storage period from 0 to 12 month led to decreasing germination % from 95% to 49% and red colored seed in TZ test (viable seed) from 97% to 54% germination after accelerated aging test from 84% to 34%, seedling length from 12.7cm to 9.3cm, seedling dry weight from 18.85mg to 9.24mg. On the other side fungi infestation % (storage fungi) was decreased from 17.13% to 8.86% with increasing storage period to 12 month. The reduction in seed germination, seed and seedlings vigor traits might be due to, with increasing storage periods, onion seeds might be infested with stored fungus or might be due to, the increase of some organic compounds consumption in respiration process with increasing moisture content and storage periods.

Interaction between seed treatments and packing materials had high significant effect on the studied traits except seed moisture content, accelerated aging test and seedling length (Table 2). Stored onion seed after treatment with vitavax in aluminum bags produced the highest

readings of germination %, TZ %, seedling dry weight and lowest readings of EC and fungi infestation%. On contrast untreated seed stored in cloth bags produced the lowest readings of seed quality traits.

Table 2. Effect of interaction between seed treatments and packing materials on seed moisture content%, germination%, tetrazolium test%, accelerated aging test%, electrical conductivity, germination rate, seedling length, seedling dry weight and fungi infection % of onion seed.

Treatments		Moisture content %	Germination %	Tetrazolium test %	Accelerated aging test%	Electrical conductivity *mmhos /gm/seed*	Germination rate	Seedling length (cm)	Seedling dry weight (mg)	Fungi infection %
Seed treatments	Packing materials									
Control	Cloth bag	9.44	62.4	69	59	0.390	0.662	11.2	13.4	30.34
	Aluminum bag	8.12	72.6	75	61	0.377	0.708	11.6	13.9	18.51
	Polyethylene	8.30	71.1	75	60	0.382	0.674	11.5	13.6	18.40
Salicylic acid	Cloth bag	9.42	64.8	71	63	0.389	0.685	11.6	14.0	15.58
	Aluminum bag	8.10	74.2	79	66	0.347	0.720	11.9	14.7	10.45
	Polyethylene bag	8.22	72.8	78	64	0.379	0.687	11.7	14.4	11.40
Vax	Cloth bag	9.21	70.4	76	71	0.386	0.649	10.9	13.9	4.90
	Aluminum bag	8.06	76.2	80	73	0.371	0.713	11.7	14.4	3.55
	Polyethylene bag	8.18	75.2	79	72	0.377	0.675	11.7	13.9	4.10
Salicylic acid+ Vitavax	Cloth bag	9.48	68.4	75	65	0.387	0.708	11.5	14.0	8.70
	Aluminum bag	8.10	75.0	80	70	0.372	0.723	11.7	14.6	5.85
	Polyethylene bag	8.22	73.2	79	68	0.378	0.689	11.6	14.3	6.85
LSD at	0.05%	NS	0.8	0.5	NS	0.001	0.020	NS	0.16	0.80
	0.01%	NS	1.1	0.7	NS	NS	NS	NS	NS	1.06

Presented data in Table 3, show, high significant effect for the interaction between seed treatments and storage periods on the studied traits except seedling length. With increasing storage period seed deterioration gradually increased specially for untreated seed where seed quality traits deteriorated after 12 month from storage. The highest percentage of fungi infestation (36.00%) was obtained from untreated seed on the other side treated seed with vitavax alleviate storage fungi infestation to 3.08% after 9 months.

Table 3. Effect of interaction between seed treatments and storage periods on seed moisture content%, germination%, tetrazolium test%, accelerated aging test%, electrical conductivity, germination rate, seedling length, seedling dry weight and fungi infection % of onion seed.

Treatments		Moisture content %	Germination %	Tetrazolium Test %	Accelerated aging test%	Electrical conductivity *mmhos/gm/ seed*	Germination rate	Seedling length (cm)	Seedling dry weight(mg)	Fungi infection %
Seed treatments	Storage periods/month									
Control	0	8.40	95	97	80	0.185	0.859	12.7	18.8	36.00
	3	8.67	84	84	75	0.212	0.810	12.2	16.6	20.75
	6	8.63	69	76	63	0.263	0.756	11.9	12.9	19.75
	9	8.70	54	58	58	0.572	0.562	11.4	11.2	18.46
	12	8.70	44	48	25	0.684	0.419	9.0	8.7	17.12
Salicylic acid	0	8.30	95	97	83	0.182	0.876	12.9	18.9	18.0
	3	8.57	86	89	78	0.209	0.828	12.6	17.2	13.29
	6	8.67	71	79	68	0.258	0.772	12.3	14.1	11.83
	9	8.67	54	61	61	0.572	0.579	11.6	12.1	10.67
	12	8.70	46	52	32	0.681	0.433	9.3	9.4	8.58
Vitavax	0	8.50	94	96	89	0.183	0.789	12.5	18.6	5.75
	3	8.47	86	91	85	0.207	0.796	12.2	16.5	4.75
	6	8.22	76	82	76	0.255	0.742	12.2	13.9	4.00
	9	8.57	60	65	69	0.569	0.580	10.7	12.2	3.08
	12	8.67	54	59	41	0.676	0.488	9.5	9.2	3.33
Salicylic acid+ Vitavax	0	8.40	95	97	84	0.183	0.885	12.6	19.1	8.75
	3	8.69	84	91	81	0.209	0.829	12.4	17.0	7.83
	6	8.60	73	82	71	0.257	0.774	12.2	13.8	6.50
	9	8.60	58	63	64	0.570	0.590	11.4	12.0	6.17
	12	8.70	51	58	36	0.678	0.454	9.4	9.6	6.42
LSD at	0.05%	0.18	1.17	0.8	1.7	0.001	0.030	NS	0.10	1.02
	0.01%	0.24	1.64	1.1	2.3	0.002	0.040	NS	0.14	1.34

Interaction between seed packing materials and storage periods had high significant effect on the tested traits (Table 4). The highest percentage of seed moisture content (9.87%) was recorded from stored seed in cloth bags after 3 months from storage. Meanwhile, the lowest percentage of seed moisture content (7.93%) was obtained from stored seed in aluminum bags after 3 months from storage. Stored seed in aluminum and polyethylene bags maintains its quality after the different storage periods comparing with cloth bags. Fungi infestation % was decreased from 17.13% for untreated seed at the first storage period to 6.04% for stored seed in aluminum bags after 12 months from storage.

Table 4. Effect of interaction between packing materials and storage period on seed moisture content%, germination%, tetrazolium test%, accelerated aging test%, electrical conductivity, germination rate, seedling length, seedling dry weight and fungi infection % of onion seed.

Treatments		Moisture content %	Germination %	Tetrazolium test %	Accelerated aging test%	Electrical conductivity *mmhos /gm/seed*	Germination rate	Seedling length (cm)	Seedling dry weight (mg)	Fungi infection %
Packing materials	Storage periods/month									
Cloth bag	0	8.40	95	97	84	0.183	0.852	12.7	18.9	17.13
	3	9.87	83	88	79	0.214	0.801	12.2	16.6	16.09
	6	9.56	69	79	68	0.264	0.746	12.0	13.4	14.63
	9	9.55	48	54	62	0.592	0.563	10.6	11.3	12.88
	12	9.55	38	45	32	0.685	0.417	9.0	9.0	13.67
Aluminum bag	0	8.40	95	97	84	0.183	0.852	12.7	18.9	17.13
	3	7.93	87	88	82	0.206	0.837	12.5	17.1	8.56
	6	7.95	75	81	71	0.255	0.782	12.2	14.0	7.88
	9	8.08	61	67	65	0.551	0.613	11.8	12.4	8.34
	12	8.13	55	61	35	0.674	0.496	9.6	9.7	6.04
Polyethylene bag	0	8.40	95	97	84	0.183	0.852	12.7	18.8	17.13
	3	8.00	86	90	80	0.207	0.809	12.4	16.9	10.31
	6	8.08	73	80	70	0.256	0.756	12.2	13.7	9.06
	9	8.28	60	65	63	0.569	0.556	11.5	12.0	7.56
	12	8.40	53	58	34	0.680	0.432	9.4	9.0	6.88
LSD at	0.05%	0.16	0.9	0.6	1.3	0.001	0.023	0.4	1.8	0.90
	0.01%	0.21	1.2	0.8	1.7	0.002	0.030	NS	2.3	1.18

Presented data in Tables 5 and 6 show the effect of interaction among seed treatments, packing materials and storage periods was high significant on all traits ,except seed moisture content, accelerated aging test, germination rate and seedling length. Initially after treatment onion seed by the tested substances there is no harmful effects on seed quality traits except germination rate which decreased after vitavax treatment comparing the other seed treatments. Treated onion seed with fungicide vitavax maintained high level of seed quality traits, followed by treated seed with salicylic acid + vitavax and treated seed with salicylic acid only before storage in aluminum or polyethylene bags after the different storage periods i.e. 3,6,9 and 12 months comparing stored seed in cloth bags without treatment (control). Fungi infection percentage decreased with prolong the storage period and it reached its lowest percent in treated seed with fungicide vitavax and treated seed with salicylic acid + vitavax. Aluminum and polyethylene bags prevented vapour entry from the surrounding air resulting low moisture content in stored seed (Table 5) consequently, lower respiration rate and metabolic activity are governed by lower moisture content and temperature during the storage period, Drew *et al.* (1970) concluded that primed onion and leek seeds stored at 10°C, maintained viability after one year of storage. This study suggested that onion seed should be treated with fungicide vitavax or salicylic acid + vitavax and storage in aluminum bags to maintain seed quality and get germination % around 60% after 12 months from storage.

Table 5. Effect of interaction among seed treatments, packing materials and storage periods on germination % and tetrazolium test % of onion seed.

Treatments		Germination %			Tetrazolium test %		
Seed treatment	Storage period (month)	Cloth bag	Aluminum bag	Polyethylene bag	Cloth bag	Aluminum bag	Polyethylene bag
Control	0		95			97	
	3	80	86	85	85	80	88
	6	65	71	70	75	79	75
	9	42	59	60	49	65	61
	12	30	52	50	37	56	52
Salicylic acid	0		95			97	
	3	84	89	86	88	90	90
	6	70	72	72	79	81	79
	9	44	60	58	50	67	65
	12	31	55	53	39	60	58
Vitavax	0		94			96	
	3	85	87	87	90	91	91
	6	72	79	77	81	82	82
	9	53	64	62	59	69	67
	12	48	57	56	52	64	61
Salicylic +Vitavax	0		95			97	
	3	83	85	84	89	92	91
	6	70	76	74	81	82	82
	9	51	62	60	58	67	65
	12	43	57	53	51	62	60
LSD at	0.05%		1.92			1.27	
	0.01%		2.60			1.70	

Table 6. Effect of interaction among seed treatments, packing materials and storage periods on electrical conductivity, seedling dry weight and fungi infection % of onion seed.

Treatments		Electrical conductivity *mmhos/g/seed*			Seedling dry weight (mg)			Fungi infection%		
Seed treatment	Storage period (month)	Cloth bag	Aluminum bag	Aluminum bag	Cloth bag	Aluminum bag	Polyethylene bag	Cloth bag	Aluminum bag	Polyethylene bag
Control	0		0.158			18.80			36.0	
	3	0.217	0.208	0.210	16.20	16.90	16.60	30.0	14.75	17.500
	6	0.269	0.260	0.261	12.70	13.10	12.90	31.50	12.75	15.00
	9	0.589	0.554	0.572	11.00	11.50	11.20	25.00	18.13	12.25
	12	0.690	0.678	0.683	8.30	9.10	8.70	29.19	10.93	11.25
Salicylic acid	0		0.182			18.90			18.0	
	3	0.215	0.206	0.207	16.80	17.50	17.20	17.63	10.25	12.0
	6	0.264	0.255	0.256	13.80	14.40	14.10	14.50	10.00	11.0
	9	0.595	0.551	0.569	11.40	12.70	12.20	14.25	8.75	9.0
	12	0.687	0.675	0.680	8.90	9.80	9.50	13.50	5.25	7.0
Vitavax	0		0.183			18.60			5.75	
	3	0.213	0.204	0.205	16.60	16.30	16.70	6.00	4.00	4.500
	6	0.261	0.251	0.253	13.50	14.20	14.00	4.00	4.00	3.50
	9	0.592	0.548	0.566	11.50	12.70	12.30	3.00	3.00	3.00
	12	0.680	0.670	0.677	9.40	10.20	8.10	3.00	3.00	3.75
Salicylic +Vitavax	0		0.183			19.10			8.75	
	3	0.213	0.206	0.207	16.70	17.50	16.90	10.25	6.00	7.25
	6	0.263	0.252	0.255	13.50	14.20	13.80	8.00	4.75	6.75
	9	0.593	0.549	0.568	11.30	12.50	12.10	8.00	4.50	6.00
	12	0.684	0.672	0.679	9.50	9.80	9.60	8.50	4.25	5.50
LSD at	0.05%		0.002			0.16			1.80	
	0.01%		0.003			0.21			2.36	

REFERENCES

Amjad, M. and M. A. Anjum (2002). Evaluation of physiological quality of onion seed stored for different periods. Int. J. Agri. Biol., 4 (3): 365-369.

Bartlett, M. S. (1937). Some samples of statistical method of research in agriculture and applied Biology. J. Roy. Soc., 4:2.

Brocklehurst, P.A. and J. Dearman (1983). Interaction between seed priming treatments and nine seed lots of carrot, celery and onion. II. Seedling emergence and plant growth. Ann. Appl. Biol., 102: 585-593.

Drew, R.L.K.; L.J. Hands and D. Gray (1997). Relating the effects of priming to germination of un-primed seeds. Seed Sci. Tech., 25: 537–548.

Farooq, M.; S.M.A. Barsa; R. Tabassum and N. Ahmed (2006). Evaluation of seed vigor enhancement techniques on physiological and biochemical basis in coarse rice (*Oryza sativa* L.). Seed Sci. Tech., 34:741-750.

Gomez, K.A. and A.A. Gomez (1984). Statistical Procedure for Agricultural Research 2nd Ed, John Wiley & Sons.

Gupta, R.P.; Ushamehra; U.B. Pandey and U. Mehra (1989). Effect of various chemicals on viability of onion seed in storage. Seed Res., 17 (1): 99-101.

Khan, M. A.; B. Gul and D. J. Weber (2004). Action of plant growth regulators and salinity on seed germination of *Ceratoides lanata*. Canadian J. Bot., 82: 37-42.

I.S.T.A. (1999). International Rules for Seed Testing, Seed Science and Technology. Proc. Int. Seed Test. Association, 31 (1): 1-152.

Korkmaz, A. (2005). Inclusion of acetyl salicylic acid and methyl jasmonate into the priming solution improves low temperature germination and emergence of sweet pepper. Hort. Sci., 40 (1): 197–200.

Krishnasamy, V. and D.V. Seshu (1990). Phosphine fumigation influence on rice seed germination and vigor. Crop Sci., 30 : 28- 85.

Kuppusamy, N. and U. Ranganathan (2014). Storage potential of primed seeds of okra (*Abelmoschus esculentus*) and beet root (*Beta vulgaris*). Australian J. of Crop Sci., 8(9):1290-1297.

Malaker, P. K.; I.H. Mian; K.A. Bhuiyah; A.M. Akanda and M.M.A. Reza (2008). Effect of storage containers and time on seed quality of wheat. Bangladesh J. Agric. Res., 33:469-477.

Matthews, S. and A. P. Alison (1987). Electrical Conductivity Test. Handbook of Vigor Test Methods, 2nd ed., 37-43. Published by ISTA. Seed Sci. and Tech., 27: 771-778.

McDonald, M. B. (2000). Seed priming . In: "Seed Technology and Its Biological Basis", (Eds.): Black, M. and Bewley, J. D.. Sheffield Academic Press, Sheffield, UK, 287–325.

Mersal, I.F.; A.A. El-Emam and Amal, H. Seleem (2006). Effect of storage period, seed moisture content and insecticides treatment on wheat (*Triticum aestivum* L.) seed quality. Ann. of Agric. Sci., Moshtohor, 44 (1): 11-24.

Popova, L.; T. Pancheva and A. Uzunova (1997). Salicylic acid: Properties, Biosynthesis and Physiological Role, 23: 85-93.

Rajasekaran, L.R.; A. Stiles; M.A. Surette; A.V. Sturz; T.J. Blake; C. Caldwell and J. Nowak (2002). Effects of various temperature regimes on germination and the role of salicylates in promoting germination at low temperatures. Canadian J. of Plant Sci., 82: 443-450.

Raskin, I. (1992). Role of salicylic acid in plants. Annu. Rev. Plant Physiol. Plant Mol. Biol., 43: 439-463.

Riekels, J.; W. H. Tiessen and L.I. Nonnecke (1976). Onions. Pub. No. 486. Ontario Dept. Agric. and Food, Ontario, Canada.

Santavec, I. and D. Kocjanacko (2011). Impact of fungicides and other preparations for seed treatment and different cultivation techniques on seed contamination of winter wheat (*Triticum aestivum,* L.). Acta Agric. Slovenica, 97 (3): 267 – 273.

Saxena, O.P.; G. Singh; H. Pakeeraiah and N. Pandey (1987). Seed deterioration studies in some vegetable seeds. Acta Hort., 215: 39-44.

Singh, B.; P. Singh; C.P. Vaish and R.P. Katiyar (1996). Effect of various fungicides on viability of onion (*Allium cepa* L.) seed in storage. Seed Res., 24 (1): 61-63.

Villela, F.A. and O.P. Beckert (2001). Osmotic potentials of aqueous solutions of polyethylene glycol 8000. J. of Seed Sci., 23:267-275.

تأثير معاملات التقاوي قبل التخزين ونوع العبوات ومده التخزين على جوده تقاوى البصل

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تم معاملة بذور البصل صنف جيزة 6 محسن بحمض السالسيلك (150 جزء في المليون) و المبيد الفطري فيتا فاكس (2 جرام / كجم) و حمض السالسيلك ثم المبيد الفطري فيتا فاكس قبل التعبئه في ثلاثة انواع مختلفة من العبوات (عبوات قماش و ورق الالومنيوم و البولي اثيلين) و ذلك لأربع فترات تخزين مختلفة 0، 3، 6 ، 9 و 12 شهرا بعد المعاملة وذلك بقسم بحوث تكنولوجيا البذور – معهد بحوث المحاصيل الحقلية- مركز البحوث الزراعية خلال الفترة من 2015 حتى 2016 م . تم تقدير النسبة المئوية للرطوبه بالبذور والنسبه المئوية للإنبات فى المعمل – اختبار التترازوليم – اختبار الشيخوخة – التوصيل الكهربي – معدل الإنبات – طول البادرة – الوزن الجاف للبادرة و الاصابة الفطرية عقب كل فترة تخزين . ادت معاملة بذور البصل بالمواد المستخدمة الى المحافظة على إنبات و قوة بذور وبادرات البصل ,كانت افضل المعاملات المستخدمة المعاملة بالمبيد الفطري فيتا فاكس و المعاملة بحمض السالسيلك + الفيتافاكس مقارنة بالبذور غير المعاملة . اثر نوع العبوة على النسبة المئوية للرطوبة بالبذور و جودة بذور البصل و كانت عبوات ور ق الألومنيوم و البولي اثيلين افضل من عبوات القماش في المحافظة على الانبات و قوة البذور والبادرات و انخفاض رطوبة البذور والإصابة الفطرية . تأثرت جودة بذور البصل بطول مدة التخزين حيث انخفضت النسبة المئوية للإنبات وصفات قوة البذور والبادرات كما انخفضت الاصابة الفطرية الى ادنى مستوياتها وذلك بزيادة مدة التخزين .أدت معاملة تقاوى البصل قبل التخزين بالمبيد الفطري فيتافاكس او بحامض السالسيلك ثم المبيد الفطري و التخزين في عبوات من ورق الألومنيوم او البولي اثيلين الى المحافظة على نسبة انبات بذور البصل وقوة البذور والبادرات مقارنة بالبذور غير المعاملة والمخزنة في عبوات من القماش. تقترح هذه الدراسة بمعامله بذور البصل بالمبيد الفطري فيتافاكس والتخزين في عبوات ورق الالومنيوم للحفاظ علي جوده بذور البصل خلال التخزين والحصول علي إنبات حقلي عالي.