Zagazig J. Agric. Res., Vol. 45 No. (3) 2018 789-807

Plant Production Science

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

# EFFECT OF STORAGE PERIODS, PACKING MATERIALS AND SOME TREATMENTS ON PEANUT (*Arachis hypogaea* L.) SEED QUALITY

**Medhat E. El-Deriny[1*], A.A-G. Ali[2], I.F. Mersal[1] and E.E.A. El-Sobky[2]**

1. Seed Technol. Res. Section, Field Crops Res. Inst., ARC, Giza, Egypt

2. Agron. Dept., Fac. Agric., Zagazig Univ., Egypt

**Received: 04/02/2018 ; Accepted: 20/02/2018**

**ABSTRACT:** Laboratory experiments and tests were conducted to study the effect of treating seed of peanut varieties; (Giza 6 and Giza 5) with moringa leaf extract and vitavax fungicide before storage in different packing materials (cloth, polypropylene and aluminum foil bags) for zero time (control), 6, 12 and 18 months from seed treatments, on seed germination (%), seed vigor, seedling vigor traits and fungi infection. The main results could be summarized as follows: there were significant differences between peanut varietie's (Giza 6 and Giza 5) seeds in seed germination (%), seed vigor, seedling vigor and fungi infection (%) where, Giza 6 variety surpassed Giza 5 variety after the different storage periods. Seed treatments significantly affected seed quality traits as measured by germination (%), good seedlings, tetrazolium potential, electrical conductivity, germination index, oil (%) and fungi infection (%). Fungicide vitavax seed treatment protect seed quality and alleviated fungi infection (%) after the different storage periods followed by moringa leaf extract comparing with untreated seeds. Type of seed packing materials, significantly affected seed germination, seed vigor, seedling vigor and fungi infection (%) where, packed seed in polypropylene surpassed aluminum and cloth bags. From the previous results, it could be concluded that treating seeds of peanut Giza 6 variety before storage with vitavax fungicide and storage in polypropylene bags gave high seed quality and alleviated fungi infection during storage periods.

**Key words:** Tetrazolium, electrical conductivity, seed quality, moringa, vitavax, peanut.

## INTRODUCTION

Peanut (*Arachis hypogaea* L.) is an annual summer crop in Egypt, as corresponding to **Economic Affairs Sector (2015)**, the total cultivated area of peanut in 2015 season was about 143022 fad., with total production of about 197243 ton with a mean of 1.379 ton/fad.

Seed value is only in its usefulness in allowing farmers to establish a good healthy field stand of crop plants. So, its important to maintain seed physiological quality which includes several factors which affect life longevity of seed embryos until planted and grow to vigor seedlings. So, Seeds have to be stored a period of time between harvest and planting during this period, seeds have to be kept for a period of time. Seeds stored for one or two cropping seasons as "carry over seed". During storage seed may be deteriorate as a result of many factors as seed moisture content, storage temperature, storage pests, mechanical damage, storage period and other factors such as varietal differences and packing materials.

Peanut varieties differed in chemical composition, germination, vigor **(El-Sayed, 2003)**, fungi infection **(Musa *et al.*, 2010; Ahmed *et al.*, 2017**) and storability. **Amer *et al.* (2012)** reported that seed size has a significant influence on the seedling and larger seeds tend to give faster emergence. Moreover, seed size positively correlated with seedling measurements and energy of germination as well as, chemical composition. Cultivated peanut (*Arachis*

[*] **Corresponding author: Tel. :** +201011449925
**E-mail address:** medhat.elderny@yahoo.com

*hypogaea* L.) belongs to genus Arachis in subtribe Stylosanthinae of tribe Aeschynomenea of family Leguminosae. It is a self-pollinated, tropical annual legume. At locations where bee activity is high, some cross-pollination can occur (**Nigam *et al.*, 1983**). Cultivated peanut has two subspecies, hypogaea and fastigiata, which in turn have two botanical varieties (var, hypogaea and var. aequatoriana).

Seed treatment is a practice that is becoming more important and common among agricultural producers by the direct reflexes on health and physiological quality of seeds that are sowing **(Machado *et al.*, 2006)**. Before storage, seed treatment may be performed jointly with processing, lowering operational costs besides avoiding possible infection caused by microorganisms during that period where seed can be treat before storage with fumigation; pesticides and natural products as plant extracts. Several investigators recommended the importance of using chemical pesticides to control the pests of stored seed (**Sultana *et al.*, 2012; Rafael *et al.,* 2013; Nataraj and Jayaramegowda, 2017**). On the other side, chemical pesticides have serious draw backs such as genetic resistance, toxic residues, worker safety, increasing costs of application and decreasing seed viability and environmental contamination. So, considerable efforts have been focused on plant derived materials, potentially useful as commercial pesticides cause smaller environmental impact. Moringa extract reduces the possibility of fungal infection and also maintains the viability and vigor of the seed for a particular time period, depending on the seed type (**Nwangburuka *et al.*, 2012**). Also, **El-Mohamedy and Aboelfetoh (2014)** reported that *Moringa oleifera* extracts had different degrees of antifungal activity against tested pathogens. Peanut seed quality can be affected by innumerous biotic and abiotic factors, including storage, which under uncontrolled conditions, exposes the seeds to oscillations of temperature and relative humidity (RH) besides the attack of pest insects and fungi, contributing to the reduction of quality.

Choice of a seed container is usually influenced by the cost of the material, easy of opening and resealing, easy of handling and availability of appropriate age. Seed containers like vapor-proof bags can be used with low-moisture content, where higher-moisture seed will result in molding, lose seed viability and death of the seed **(Meena *et al.,* 2017). Chowdhury *et al.* (2003) and Bessa *et al.* (2015)** reported that seeds of peanut maintained satisfactory germination for two months stored in gunny bag and for 8 months in polyethylene bag. The moisture content of the peanuts varied significantly ($p \leq 0.05$) from (3.3 to 6.9%) with samples stored in different bag types recording mean values of: 5.1% - polypropylene, (5.2%) - polyethylene, and (5.3%) - jute. Physical damage – which ranged from (0.1 to 9.8%) - was significantly influenced by storage temperature and R.H., and the type of storage bag **(Mutegi *et al.*, 2013)**. So, the aim of this investigation was to study the effect of treating seed of peanut varieties; Giza 6 and Giza 5 with Moringa leaf extract and Vitavax fungicide before storage in different packing materials (cloth, polypropylene and aluminum bags) for zero time (control), 6, 12 and 18 months from seed treatments, on seed germination (%), seed vigor, seedling vigor traits and fungi infection.

# MATERIALS AND METHODS

Laboratory experiments and tests were conducted at the Laboratories of Seed Technology Research Department, El Mansoura, Dakahlia Governorate, Field Crops Research Institute, Agricultural Research Center, Egypt, during the period from (2015 to 2016) years *i.e.* from January 2015 to July 2016, to study the effect of treating seed of peanut varieties; Giza 6 and Giza 5 with moringa leaf extract and vitavax fungicide before storage in different packing materials (cloth, polypropylene and aluminum bags 1 kg for each treatment) for zero time (control), 6, 12 and 18 months from seed treatments, on seed germination (%), seed vigor, seedling vigor traits and fungi infection. Peanut seeds were obtained from Legume Crops Research Department, Field Crops Research Institute, ARC, Egypt. The experimental design was randomized complete design with four replications.

## Seed Moisture Contents

Peanut pods were handle shelled and seed moisture content before treatment was determined which was (18 ± 1%).

### Adjustment of moisture content levels

Seed moisture content of peanut seeds was determined before any treatment by electrical air-oven method layout by **AOAC (1984)** and it was (18 ± 1%). To obtain 10% moisture level, seeds were dried in speed dry air apparatus Model Retsch (F-Kurt Retsch Gonb H and Co. KG D.42781 HAAN Germany) until obtaining moisture level (10 ± 0.5%).

## Studied Factors

### Peanut varieties

The tested peanut varieties were Giza 5 and Giza 6. Each of these botanical varieties has different plant, pod and seed characteristics. However, most of the commercially cultivated varieties belong to the hypogaea (common name/market type:Virginia or runner), fastigiata (valencia), and vulgaris (Spanish) botanical variety groups.

### Seed treatments

### Seed treatments with Moringa leaf extract

Five hundred grams of Moringa leaves were air dried for 10 days followed by further drying in air oven at 45$^o$C for two days until constant weight. Dried leaves were ground, sieved and preserved away from light and moisture until used in preparing the crude extracts. Crude extract was prepared according to the method adopted by **Freedman *et al.* (1979)**.

### Seed treatment with vitavax fungicide

Peanut seeds were treated with the recommended dose (2 g/kg) of fungicide vitavax which back dried for the original moisture content before packing.

### Packing materials

Seed samples of each seed treatment were taken and packaged in cloth, polypropylene and aluminum bags for the four storage periods *i.e.* initially after treatments (zero time) six, twelve and eighteen months after treatments.

## Studied Characters

After each storage period the following traits *i.e.* germination (%), good seedling (%) germination index, tetrazolium potential (1-5) percentage, electrical conductivity (EC) "mmhos/g seed", oil (%), were studied.

### Germination (%)

Germination tests were performed according to International Seed Testing Association (**ISTA, 1999**).

### Good seedlings (%)

Percentage of good seedling was recorded according to **(ISTA, 1999).**

### Germination index (GI)

It was calculated according to the rules of the Association of Official Seed Analysis (**AOSA, 1983**)

### Tetrazolium potential (1-5) percentage

Tetrazolium salt stains all living tissue in the cotyledons and embryo red colour, thus enabling trained analysts to determine the seeds viability or otherwise. The tetrazolium test (TZ) is used to give a quick estimate of germination potential. The result of a tetrazolium test will generally predict the germination test result closely (**ISTA, 1999**).

### Electrical conductivity

Electrical conductivity test was carried out using three replicates of 50 seeds from peanut seed which were weighed, and soaked in beakers containing 250 ml deionized water for 24 hours at 20ºC percentage according to **AOSA (1983)**.

### Determination of seed oil (%)

Seed oil (%) was determined according to (**AOAC, 1984**)

### Fungi infection (%) (FI%)

Fungi infection (%) of peanut seeds was carried out using the standard blotter method as described by the International Seed Testing Association (**ISTA, 1999**). The percentage frequency of fungi was calculated as:

$$FI(\%) = \frac{\text{No. of seeds containing fungi}}{\text{Total No. of seeds assessed}} \times 100$$

### Statistical Methods

Collected results were subjected to the statistical analysis of variance (ANOVA) for randomized complete design "RCD" as mentioned by **Gomez and Gomez (1984)** using **(MSTAT-C, 1984)** Computer software package**.** The treatment means were compared using Duncan's multiple range test (**Duncan, 1955**), where means had different letters were statistically significant, while those means followed by the same letter were statistically insignificant. In the interaction tables capital and small letters were used to compare between means in rows and columns, respectively.

## RESULTS AND DISCUSSION

### Germination (%)

Germination (%) of peanut seed results as influenced by varietal difference, seed treatment, packing material and their interactions are presented in Table 1. Respecting to the varietal differences, the results stated highly significantly differences throughout the storage periods tried whereas the gradual reduction in germination (%) was noticed in both peanut varieties through the storage period. Giza 6 variety achieved higher germination (%) during various storage periods than Giza 5 variety. These differences among between peanut varieties could be attributed to genetical effects on germination potential of peanut seed. In this connection, **Deshpande *et al.* (2003), El-Sayed (2003), Kathmale *et al.* (2003), Al-Amod (2015) and Ahmed *et al***. **(2017)** reported that peanut varieties showed such varietal differences, regarding germination (%).

Concerning the influence of seed treatments on germination (%) during storage periods, the results in the same Table show that vitavax treatment recorded the highest germination (%) during the three storage periods. In other words, these results indicated that vitavax treatment appeared to be more safety to protect peanut seeds during storage which followed by moringa treatment in this respect. However, the control treatment recorded the lowest germination (%) while the highest germination (%) through the storage period investigated was recorded by vitavax treatment. These results are in accordance with those reported by **Awad *et al.* (1994), Hashem *et al.* (1997), Nghiep and Gaur (2005), Sultana *et al.* (2012) and Nataraj and Jayaramegowda (2017)**.

Respecting to the influence of packing material on germination (%) during the storage periods, the results in Table 1 indicate that polypropylene bags gave the highest germination (%) during the three storage periods as compared by aluminum and cloth bags. These results confirmed by the highly significant differences during the three storage periods. In other words, the results indicated that polypropylene bags showed more protecting for peanut seed viability during storage which followed by aluminum bags. Otherwise, cloth bags gave the lowest germination (%) and the highest germination through the storage periods tested. These results are in agreement with those reported by **Tame *et al.* (2013), Suriyong *et al***. **(2015) and Meena *et al***. **(2017**), they reported that polyethylene bags gave the highest germination (%) compared to paper and cloth bags.

The interaction effects between the studied factors on germination (%) after $18^{th}$ months from storage were significant, the interaction effect between peanut varieties and seed treatments (Table 1-a) indicated that Giza 6 variety achieved the highest germination (%) when the seed treated by vitavax fungicide, while the lowest germination was obtained by Giza 5 variety with control treatment (untreated seed). Furthermore, the significant interaction effects between peanut varieties and packing materials (Table 1-b) showed that Giza 6 variety recorded the highest germination (%) when either polypropylene or aluminum bags were used. Finally, the significant interaction effects between seed treatments and packing materials (Table 1-c) showed that the highest germination (%) was recorded by moringa seed treatment when polypropylene bags were used followed by vitavax fungicide when aluminum bags were used.

**Table 1. Germination (%) and good seedling (%) of peanut seeds as affected by varieties, seed treatments, packing materials and their interactions after 0, 6, 12 and 18 months from storage and their combined (started from January 2015 to July 2016)**

| Storage period (month) / Main effects and interactions | Germination (%) | | | | | Good seedling (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 2015 | 6 2015 | 12 2016 | 18 2016 | Mean | 0 2015 | 6 2015 | 12 2016 | 18 2016 | Mean |
| **Variety (V)** | | | | | | | | | | |
| **Giza 6** | 92.22 | 90.45 | 86.67 | 75.77 | 86.28 | 74.2 4 | 67. 97 | 54.66 | 50.67 | 61.89 |
| **Giza 5** | 88.19 | 82.26 | 74.45 | 68. 65 | 78.39 | 73. 93 | 57. 65 | 48.47 | 49.52 | 57.39 |
| **$F_{test}$** | ** | ** | ** | ** | ------- | NS | ** | ** | ** | ------- |
| **Seed treatment (T)** | | | | | | | | | | |
| **Control (untreated)** | 90.25 + | 85.06 c | 78.89 c | 68.65 b | 80.71 | 73.56c+ | 59. 85b | 50.58b | 46.00c | 57.50 |
| **Moringa leaf extract** | 89.84 | 86.50 b | 80.11 b | 73.34 a | 82.45 | 75.82b | 64.23a | 52.42a | 51.22b | 60.92 |
| **Vitavax fungicide** | 90.35 | 87.33 a | 82.84 a | 74.55 a | 83.77 | 77.33a | 64.62a | 52. 63a | 53.06a | 61.91 |
| **F test** | NS | ** | ** | ** | ------- | ** | ** | * | ** | ------- |
| **Packing material (P)** | | | | | | | | | | |
| **Cloth bags** | 89.90 ++ | 86.11 b | 79.24 b | 66.41 b | 80.42 | 73.85++ | 60.55 | 47.85b | 43.56c | 56.45 |
| **Polypropylene bags** | 90.21 | 87.00 a | 82.81 a | 75.52 a | 83.88 | 74.77 | 63. 83 | 53. 92a | 58.17a | 62.67 |
| **Aluminum bags** | 90.32 | 85.78 b | 79.42 b | 74.44 a | 82.49 | 73.65 | 61.94 | 53. 28a | 48.56b | 59.36 |
| **F test** | NS | ** | ** | ** | ------- | NS | NS | ** | ** | ------- |
| **Mean** | 90.16 | 86.31 | 80.55 | 72.17 | ------- | 74.64 | 62.58 | 51.73 | 50.10 | ------- |
| **Interactions** | | | | | | | | | | |
| **V × T** | ------- | * | ** | ** | ------- | ** | * | * | ** | ------- |
| **V × P** | ------- | NS | NS | ** | ------- | NS | NS | * | ** | ------- |
| **T × P** | ------- | NS | ** | ** | ------- | NS | * | ** | ** | ------- |

Where *, ** and NS refers to significantly differ at P<0.05 and P<0.01 levels and not significant, respectively
\+ Just tested after treated before packing
++ Just tested before packing

**Table 1-a. Germination (%) of peanut seeds as affected by interaction between varieties (V) and seed treatments (T) after 18 months from storage**

| Seed treatment / Variety | Control (untreated) (T1) | Moringa (leaf extract) (T2) | Vitavax (fungicide) (T3) |
|---|---|---|---|
| | C | B | A |
| **Giza 6 (V1)** | 71.67 a | 76.44 a | 79.20 a |
| | B | A | A |
| **Giza 5 (V2)** | 65.44 b | 70.22 b | 70.15 b |

**Table 1-b. Germination (%) of peanut seeds as affected by interaction between varieties (V) and packing materials (P) after 18 months from storage**

| Variety / Packing material | Cloth bags (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| | B | A | A |
| **Giza 6 (V1)** | 68.33 a | 79.11 a | 79.66 a |
| | C | A | B |
| **Giza 5 (V2)** | 64.55 b | 71.88 b | 69.22 b |

**Table 1-c. Germination (%) of peanut seeds as affected by interaction between seed treatments (T) and packing materials (P) after 18 months from storage**

| Seed treatment / Packing material | Cloth bags (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| **Control (T1)** | C | A | B |
| **(untreated)** | 60.17 c | 73.18 c | 72.50 c |
| **Moringa (T2)** | C | A | B |
| **(leaf extract)** | 68.33 b | 77.20 a | 74.67 b |
| **Vitavax (T3)** | B | A | A |
| **(fungicide)** | 70.83 a | 76.50 b | 76.17 a |

However, the lowest germination (%) was detected by control treatment when cloth bags were used.

## Good Seedling (%)

The results indicated highly significant difference during the three storage periods, whereas Giza 6 variety appeared to be achieved higher good seed length (%) than Giza 5 variety. These results followed the same patterns of germination (%) (Table 1) which stated that such significant differences between the two varieties mostly due to the genetic structure and potentiality in seed vigor as well as storability. Also, both varieties showed gradually decrease in good seedling (%) during storage periods. These results are in agreement with those reported by **Patra *et al.* (2000) and Murali *et al.* (2002).**

Concerning the influence of seed treatments on good seedling (%) (Table 1), the results showed that vitavax seed treatment obtained the highest good seedling (%) at (0) storage and at 18 months from storage which followed by moringa treatment. However, the untreated seed (control) gave the lowest good seedling (%) during storage periods investigated. These results are in a good line with those reported by **Verma *et al.* (2003) and Nghiep and Gaur (2005).**

Regarding the influence of packing materials on good seedling (%), the results in Table 1 show that polypropylene bags achieved higher good seedling (%) which, followed by aluminum bags than cloth bags. However, the differences could not reach the level of significance at both (0) storage and (6) months storage period. These results are in agreement with those reported by **Tame *et al.* (2013) and Meena *et al.* (2017)** who reported that polyethylene bag was better to store the seed to maintain the quality for longer period.

Table 1 show significant interaction effects. Most of them did not add more information than the main effects of the three factors under study where showed superiority of Giza 6 variety, vitavax seed treatment and polypropylene bags compared with other variety, seed treatment and packing materials used therefore, their results were not presented, concerning good seedling (%).

## Germination Index

Germination index results as a seedling vigor potential indicator during storage periods investigates are presented in Table 2. The obtained results showed highly significant differences between peanut varieties throughout the storage periods, whereas Giza 6 variety obtained higher germination index values compared with Giza 5 variety with general mean of (25.09 and 21.28), respectively. These results almost followed the same patterns of germination (%) and good seedling (%), (Table 1) stated the superiority of Giza 6 variety over Giza 5 variety in seed quality measurements as well as during storage periods. The varietal differences between seed quality of peanuts were reported by other investigators included, **Deshpande *et al.* (2003), El-Sayed (2003), Kathmale *et al.* (2003), Kurdikeri *et al.* (2003) and Ahmed *et al.* (2017).**

Seed treatment in Table 2 revealed highly significant differences during the three storage periods, where moringa seed treatment achieved the highest germination index value which followed by vitavax seed treatment, while untreated seed treatment (control) gave the lowest germination index value. These results are in a good line with those reported by **Machado *et al.* (2006), Nouman *et al.* (2012) and Ibrahim and Abo El-Dahab (2016).**

Concerning the influence of packing materials on germination index (Table 2), the obtained results indicated highly significant differences during 6 and 12 months storage periods, where both polypropylene and aluminum bags recorded higher germination index values than cloth bag. While the differences could not reach the level of significance after the 18 months storage period. Then, the general mean of (23.26, 23.42) and (22.85) germination index values were recorded by polypropylene, aluminum and cloth bags, respectively. These results almost followed the same patterns of germination (%) and good seedling (%) (Table 1). These results are in agreement with those reported by **Tammanagouda (2002), Rashmireddy (2003), Ankaiah *et al.* (2006) and Meena *et al.* (2017)**. With respecting to the general reduction in germination index through the storage periods for the studied factors, the results showed gradual decrease in germination index values from 6 months to 12 months storage periods which ranged from (24.25 to 26.33).

Table 2 show significant interaction effects between the studied factors. Most of them did not bring more information than the main effects of the three factors under study, therefore, their results were not presented or discussed.

## Tetrazolium Potential (1-5) Percentage (TZ)

The TZ potential (1-5) percentage was used as a rapid seed test for determining the seed viability among peanut varieties, seed treatment and packing materials during the storage periods investigated (Table 3). The TZ potential percentage represented seeds that are capable of producing normal seedlings under favorable germination conditions. Meanwhile, TZ potential results revealed highly significant differences between peanut varieties during storage periods investigated, whereas Giza 6 variety achieved higher TZ- potential percentage compared with Giza 5 variety. These results confirmed the superiority of Giza 6 variety over Giza 5 variety, which followed the same patterns of germination index (Table 2). The obtained results are in accordance with those reported by **El-Sayed (2003)**. Also, varietal differences were observed by other investigators included **Musa *et al.* (2010), Santos *et al.* (2016) and Ahmed *et al.* (2017)**. Meanwhile, seed treatment results (Table 3) revealed highly significant and significant differences after 6 and 18 months storage periods where moringa and vitavax seed treatments

**Table 2. Germination index of peanut seeds as affected by varieties, seed treatments, packing materials and their interactions during 0, 6, 12 and 18 months storage periods and their combined (started from January 2015 to July 2016)**

| Storage period (month) / Main effects and interactions | Germination index | | | | |
|---|---|---|---|---|---|
| | 0<br>2015 | 6<br>2015 | 12<br>2016 | 18<br>2016 | Mean |
| **Variety (V)** | | | | | |
| **Giza 6** | 21.63 | 29.21 | 26.25 | 23.26 | 25.09 |
| **Giza 5** | 20.11 | 23.45 | 22.25 | 19.29 | 21.28 |
| **F test** | NS | ** | ** | ** | -------- |
| **Seed treatment (T)** | | | | | |
| **Control (untreated)** | 21.76 + | 25.97 b | 22.75 c | 20.03 c | 22.63 |
| **Moringa leaf extract** | 19.88 | 26.87 a | 25.54 a | 22.21 a | 23.63 |
| **Vitavax fungicide** | 20.96 | 26.16 b | 24.45 b | 21.59 b | 23.29 |
| **F test** | NS | ** | ** | ** | ----------- |
| **Packing material (P)** | | | | | |
| **Cloth bags** | 21.69 ++ | 25.69 b | 23.66 b | 20.35 | 22.85 |
| **Polypropylene bags** | 19.63 | 26.70 a | 24.67 a | 22.04 | 23.26 |
| **Aluminum bags** | 21.25 | 26.60 a | 24.41 a | 21.43 | 23.42 |
| **F test** | NS | ** | ** | NS | ----------- |
| **Mean** | 20.85 | 26.33 | 24.25 | 21.28 | ----------- |
| **Interactions** | | | | | |
| **V × T** | ** | ** | ** | ** | ----------- |
| **V × P** | NS | ** | NS | ** | ----------- |
| **T × P** | NS | ** | ** | ** | ----------- |

Where *, ** and NS refers to significantly differ at P<0.05 and P<0.01 levels and not significant, respectively
\+ Just tested after treated before packing
++ Just tested before packing

**Table 3. Tetrazolium potential (1-5) percentage and electrical conductivity (mmhos/g seed) of peanut seeds as affected by varieties, seed treatments, packing materials and their interactions during o, 6, 12 and 18 months storages (started from January 2015 to July 2016)**

| Main effects and interactions / Storage period (month) | Tetrazolium potential (%) | | | | | Electrical conductivity (mmhos/g seed) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 6 | 12 | 18 | Mean | 0 | 6 | 12 | 18 | Mean |
| | 2015 | 2015 | 2015 | 2016 | | 2015 | 2015 | 2016 | 2016 | |
| **Variety (V)** | | | | | | | | | | |
| **Giza 6** | 92.78 | 91.96 | 89.77 | 82.14 | 89.16 | 0.009 | 0.010 | 0.029 | 0.024 | 0.018 |
| **Giza 5** | 90.67 | 84.38 | 78.96 | 73.37 | 81.85 | 0.010 | 0.011 | 0.045 | 0.022 | 0.022 |
| **F test** | ** | ** | ** | ** | ------- | NS | NS | ** | NS | ------- |
| **Seed treatment (T)** | | | | | | | | | | |
| **Control (untreated)** | 91.83 + | 87.22b | 84.77 | 76.78b | 85.15 | 0.008 + | 0.012 a | 0.047a | 0.026 | 0.023 |
| **Moringa leaf extract** | 91.50 | 88.00a | 85.55 | 78.29a | 85.84 | 0.011 | 0.010 a | 0.047a | 0.022 | 0.023 |
| **Vitavax fungicide** | 91.83 | 89.28a | 86.25 | 78.22a | 86.40 | 0.011 | 0.008 b | 0.016b | 0.021 | 0.014 |
| **F test** | NS | ** | NS | * | ------- | NS | ** | ** | NS | ------- |
| **Packing material (P)** | | | | | | | | | | |
| **Cloth bags** | 91.65++ | 88.17 | 83.67 | 76.72b | 85.05 | 0.01++ | 0.011 | 0.069a | 0.022 | 0.028 |
| **Polypropylene bags** | 92.11 | 88.72 | 85.44 | 78.28a | 86.14 | 0.010 | 0.011 | 0.027b | 0.023 | 0.018 |
| **Aluminum bags** | 90.70 | 87.61 | 84.22 | 78.28a | 85.20 | 0.010 | 0.010 | 0.015c | 0.024 | 0.015 |
| **F test** | NS | NS | NS | * | ------- | NS | NS | ** | NS | ------- |
| **Mean** | 91.72 | 88.17 | 84.80 | 77.76 | ------- | 0.010 | 0.010 | 0.037 | 0.023 | ------- |
| **Interactions** | | | | | | | | | | |
| **V × T** | ** | ** | NS | * | ------- | NS | * | ** | * | ------- |
| **V × P** | NS | NS | NS | ** | ------- | NS | NS | NS | * | ------- |
| **T × P** | NS | NS | ** | ** | ------- | NS | NS | ** | * | ------- |

Where *, ** and NS refers to significantly differ at $P<0.05$ and $P<0.01$ levels and not significant, respectively
\+ Just tested after treated before packing
++ Just tested before packing

showed higher TZ- potential percentage compared with untreated seed. These results indicated that treated seed of peanuts with vitavax or moringa appeared to be capable to protect peanuts seed quality during storage. These results are in accordance with those reported by **Nouman *et al.* (2012), Ibrabim and Abo El-Dahab (2016) and Nataraj and Jayaramegowda (2017)**.

Concerning the influence of packing materials on TZ- potential percentage (Table 3), the obtained results showed significant difference only after 18 months storage period, where both polypropylene and aluminum bags gave higher TZ potential compared to cloth bags which recorded the lowest in TZ- potential percentage. However, the storage periods of 6 and 12 months had no significant effects on TZ-potential percentage. These results are in a good line with those reported by **Patra *et al.* (2000), Biradar (2001), Rashmireddy (2003), Ankaiah *et al.* (2006) and Meena *et al.* (2017)**. Generally, the TZ-potential percentage decreased during storage periods ranged from 77.76 to 91.72% for the general mean of the studied factors. In this connection, it could be concluded that the significant interaction effects between the studied factors (Table 3) revealed the superiorty of Giza 6 variety in TZ- potential percentage when seed were treated by moringa or vitavax as seed treatments (Table 3-a) and stored in polypropylene bags (Table 3-b). Also, the significant interaction between seed treatments and packing materials (Table 3-c) indicated that the highest TZ-potential percentage was obtained by vitavax seed treatment and stored in polypropylene bags which followed by vitavax seed treatment and stored in aluminum bags.

## Electrical Conductivity (EC) test "mmhos/g Seed"

Conductivity test is based on the premise that as seed deterioration progresses, the cell membranes become less rigid and more solute, allowing solute cell materials to scape. These exudates increase the electrical conductivity of the soaking solution. Electrical conductivity of peanut varieties during storage periods investigated are presented in Table 3. The presented results indicated highly significant differences between the two varieties just after 12 months storage period where Giza 6 variety gave lower "EC" values than Giza 5 variety. Otherwise, no significant differences could be detected between peanut varieties after 6 and 18 months storage periods, respecting EC values. Generally, Giza 6 variety gave lower EC value (0.018 mmhos/g seed) than Giza 5 variety (0.022 mmhos/g seed), regarding the general mean during storage periods investigated. These results taken the reverse direction of the forms presents seed viability and vigor results included germination (%), good seedling (%), germination index and TZ- potential percentage. Thus, these results of EC indicated that low EC variety (Giza 6) have higher viability and vigor potential than high EC variety (Giza 5). The significant varietal differences among field crops in electrical conductivity were reported by **Krishnappa *et al.* (2001), Aliloo and Shokati (2011) and Eraky (2015)**. However, **Ali (1979)** reported that care should be taken in using EC test alone as a seed viability measurement.

Concerning the influence of seed treatments (Table 3), the results revealed highly significant differences on EC after 6 and 12 months, where untreated and moringa seed treatments gave higher EC values than vitavax seed treatments. Although the same trend was observed on storage period of 18 months, the differences could not reach the level of significance. In other words, vitavax seed treatment showed higher protection for stored peanut seed and its viability during storage periods than either untreated or moringa seed treatments. These results are in accordance with those reported by **Hashem *et al.* (1997), Sultana *et al.* (2012)** as well as **Verma and Verma (2014)**.

Regarding the influence of packing materials on EC values (Table 3), the results indicated highly significant differences between packing materials used only on storage period after 12 months where cloth bags gave the highest EC value compared with both polypropylene and aluminum bags. That means that storage peanut seeds in cloth bags tended to be gradually decreases viability and increases seed deterioration more than storage peanut seed in polypropylene and aluminum bags. These results followed the same patterns of the most

**Table 3-a. Tetrazolium potential (1-5) (%) of peanut seeds as affected by interaction between varieties (V) and seed treatments (T) after 18 months from storage**

| Seed treatment / Variety | Control (untreated) (T1) | Moringa (leaf extract) (T2) | Vitavax (fungicide) (T3) |
|---|---|---|---|
| | B | A | A |
| **Giza 6 (V1)** | 79.12 a | 82.11 a | 82.44 a |
| | B | A | A |
| **Giza 5 (V2)** | 71.66 b | 74.44 b | 74.87 b |

**Table 3-b. Tetrazolium potential (1-5) (%) of peanut seeds as affected by interaction between varieties (V) and packing materials (P) after 18 months from storage**

| Packing material / Variety | Cloth bag (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| | C | A | B |
| **Giza 6 (V1)** | 79.56 a | 83.78 a | 81.13 a |
| | C | A | B |
| **Giza 5 (V2)** | 71.89 b | 75.78 b | 73.48 b |

**Table 3-c. Tetrazolium potential (1-5) (%) of peanut seeds as affected by interaction between seed treatments (T) and packing materials (P) after 18 months from storage**

| Packing material / Seed treatment | Cloth bags (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| **Control (T1)** | C | A | B |
| **(untreated)** | 74.83 b | 78.68 b | 76.11 b |
| **Moringa (T2)** | C | B | A |
| **(leaf extract)** | 75.64 b | 77.25 b | 78.33 a |
| **Vitavax (T3)** | C | A | B |
| **(fungicide)** | 77.88 a | 81.78 a | 79.65 a |

seed viability and vigor measurements mentioned before, since cloth bags showed lower values of seed viability and vigor measurements than polypropylene and aluminum bags. The obtained results are in agreement with those reported by **Bindu (1997), Rajendraprasad *et al.* (1998), Ankaiah *et al.* (2006), Tame *et al.* (2013) and Meena *et al.* (2017)**. Generally, EC values increased during storage periods indicating to the reduction of peanut seed viability and vigor and increasing seed deterioration during seed storage which varies between peanut varieties, seed treatments and packing materials applied. In this connection increases EC values, significantly showing more seed deterioration during seed storage. Table 3 show significant interaction effects between the studied factors. Most of them did not add more information than the main effects of the three factors under study therefore, their results were not presented.

## Oil (%)

Regarding to the varieties performance, results in Table 4 show that oil (%) highly significant differed due to the studied peanut varieties after the different storage periods. Seeds of peanut variety, Giza 5 surpassed Giza 6 in oil (%) after the different storage periods where the general mean of Giza 5 variety reached 45.28% comparing for Giza 6 variety (42.68%). With increasing storage period, oil (%) was gradually decreased. The decrease in oil content with increasing storage period and variation between varieties may be refers to age induced depletion phenomenon, improper storage environment or may due to the highest activity of fungi and variation in chemical composition. Similar results were reported by **Narayanaswamy (2003)** who concluded that oil of peanut seed decreased with advancement of storage period.

Referring to the effect of seed treatments on seed oil (%), it was highly significant after the different storage periods except at the zero period (directly after treatment) as illustrated from results in Table 4. Treated seed with moringa leaf extract had the highest percentage of seed oil comparing the other seed treatments with general mean (44.19%) comparing with (43.92%) and (43.83%) for untreated seeds and treated seeds with vitavax, respectively. The lowest oil percentage may be related to enzymic and non- enzymic autoxidation of lipids. Similar decrease in oil (%) was reported by **Narayanaswamy (2003)**.

With regard to the effect of packing materials on oil (%) of peanut seed, highly significant effects was recorded after 6 and 12 month only as demonstrated from results in Table 4. In general oil (%) of peanut seeds was decreased with increasing storage period. After 18 months from storage the highest percentage of seed oil (43.42%) was obtained from packed seed in polypropylene bags followed by aluminum and cloth bags. Similar results were reported by **Narayanan and Prakash (2015)** in sesame seed where stored seed in polyethylene bags registered high oil content comparing control.

Interaction between peanut varieties and packing materials had significant effect after 18 months from storage as illustrated from results in Table 4-a. Packing seed of peanut variety Giza 5 in polypropylene and cloth bags gave high seed oil (44.74%) and (44.26%), respectively. On contrast the lowest percentage of seed oil (41.56%) was obtained by Giza 6 variety seed when stored in cloth bags.

## Fungi Infection (%)

Results of fungi infection (%) as affected by variety differences, seed treatments, packing materials and their interactions are presented in Table 4. Peanut varieties significantly differed in fungi infection (%) at the first and second storage periods meanwhile insignificant effects were noticed at third and fourth storage periods. At (0) storage period, the highest (%) of fungi infection (22.44%) was recorded by Giza 5 variety seed comparing to 20.15% with Giza 6 variety seed. After 6 months from storage, the same trend was noticed where fungi infection (%) of Giza 5 variety seed was more than Giza 6 variety seed by 4.63%. In other words, these results revealed that field fungus infection was decreased with increasing storage periods meanwhile, storage fungus were increased with increasing storage periods. On the other side, after the different storage periods fungi infection (%) of Giza 5 variety seed was more than Giza 6 with general mean 15.91 and 13.00% for Giza 5 and Giza 6, respectively. The differences

**Table 4. Averages of oil (%) and fungi infection (%) of peanut seeds as affected by varieties, seed treatments, packing materials and their interactions during 0, 6, 12 and 18 months storage periods and their combined (started from January 2015 to July 2016)**

| Storage period (month) / Main effects and interactions | Oil (%) | | | | | Fungi infection (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 2015 | 6 2015 | 12 2016 | 18 2016 | Mean | 0 2015 | 6 2015 | 12 2016 | 18 2016 | Mean |
| **Variety (V)** | | | | | | | | | | |
| **Giza 6** | 43.42 | 43.03 | 42.32 | 41.96 | 42.68 | 20.15 | 13.07 | 11.55 | 7.26 | 13.00 |
| **Giza 5** | 46.33 | 45.66 | 44.87 | 44.25 | 45.28 | 22.44 | 17.70 | 13.58 | 9.93 | 15.91 |
| **F test** | ** | ** | ** | ** | | * | ** | NS | NS | |
| **Seed treatment (T)** | | | | | | | | | | |
| **Control (untreated)** | 45.11 + | 44.50a | 43.39b | 42.68b | 43.92 | 24.67 a+ | 24.16a | 26.33a | 29.63a | 26.20 |
| **Moringa leaf extract** | 45.21 | 44.45a | 43.87a | 43.23a | 44.19 | 23.50 a | 17.66b | 13.16b | 11.63b | 16.43 |
| **Vitavax fungicide** | 44.30 | 44.09b | 43.53b | 43.41a | 43.83 | 12.50 b | 8.33c | 7.67c | 5.44c | 8.49 |
| **F test** | NS | ** | ** | ** | -------- | ** | ** | ** | * | -------- |
| **Packing material (P)** | | | | | | | | | | |
| **Cloth bags** | 45.10 ++ | 44.64a | 43.72a | 42.91 | 44.09 | 19.15 ++ | 19.16a | 22.50a | 27.36a | 22.04 |
| **Polypropylene bags** | 44.90 | 44.13b | 43.45b | 43.42 | 43.98 | 19.56 | 11.83c | 8.50c | 5.27c | 11.29 |
| **Aluminum bags** | 44.71 | 44.27b | 43.63a | 42.98 | 43.90 | 19.18 | 17.16b | 15.16b | 11.33b | 15.71 |
| **F test** | NS | ** | * | NS | -------- | NS | ** | ** | ** | -------- |
| **Mean** | 44.88 | 44.35 | 43.60 | 43.11 | -------- | 20.14 | 16.13 | 14.81 | 13.48 | -------- |
| **Interactions** | | | | | | | | | | |
| **V × T** | NS | * | NS | NS | -------- | ** | ** | ** | ** | -------- |
| **V × P** | NS | * | * | * | -------- | NS | ** | NS | ** | -------- |
| **T × P** | NS | * | NS | NS | -------- | NS | ** | ** | ** | -------- |

Where *, ** and N S refers to significantly differ at P<0.05 and P<0.01 levels and not significant, respectively
\+ Just tested after treated before packing
++ Just tested before packing

between peanut varieties in fungi infection might be due to differential responses of genotypes to different field and storage environment. These results are in accordance with those reported by **Janardhan *et al.* (2011), Al-Amod (2015), Aslam *et al.* (2015) and Ahmed *et al.* (2017)**.

Regarding to the influence of seed treatments on fungi infection (%) after the tested storage periods, results in Table 4 revealed that significant effects for seed treatments were recorded. Fungi infection (%) of treated seeds with vitavax fungicid and moringa leaf extract were decreased with increasing storage periods on contrast, it increased in untreated seeds with increasing storage periods. For example, vitavax treatment reduced fungi infection with increasing storage period to 18 month with a reduction range from (5.44 to 12.5%) than control, meanwhile moringa extract treatment recorded a reduction valued 11.87%. On the other side, fungi infection (%) was increased from 24.67% to 29.63% with increase range (4.96%) of fungi infection (%). General mean for the different storage periods also affected by seed treatments and ranged from (8.49 to 16.43 and 26.20%) for treated seed with vitavax, moringa and control, respectively. From these results, vitavax treatment alleviated fungi infection followed by moringa treatment. The highest (%) was obtained by untreated seed (control) after the different storage periods. Fungicide vitavax played significant role in inhibiting storage fungi and this might attribute to minimum coat damage of peanut seed. So, treated seed with vitavax reduced fungi infection compared to untreated seed (control). The obtained results are in agreement with those reported by **Hashem *et al.* (1997), Nghiep and Gaur (2005), Nwangburuka *et al.* (2012) and El-Mohamedy and Aboelfetoh (2014).**

With respect to the effect of packing materials on fungi infection (%) of peanut seed after 6, 12 and 18 months from storage, high significant effects were obtained as demonstrated from the results in Table 4. After the different storage periods, packing peanut seed in polypropylene bags protect peanut seed and alleviate fungi infection with a range (14.29%) comparing to control, meanwhile aluminum bags reduced fungi infection by 7.85%. On contrast, fungi infection of packed seed in cloth bags was increased from (19.15 to 27.36%) after 18 months from storage with mean increase of 8.21%. These results confirmed by the highly significant differences after the three storage periods as well as through the general mean of (11.29, 15.71 and 22.04%) for polypropylene, aluminum and cloth bags, respectively. From these results, polypropylene bags were more efficiency for protect peanut seed from infection. Polypropylene and aluminum containers acted as moisture proof barriers resulted lower moisture seed content. Lower seed moisture content resulted in lower respiration rate, lower metabolic activity and reduce fungi infection during the different storage periods than aluminum and cloth bags activity. These results are in harmony with those reported by **Bhattacharya and Raha (2002), Malaker *et al.* (2008)** and **Souza *et al.* (2014)**

With respect to the effect of interaction between peanut varieties and seed treatments after 18 months from storage, significant effect was obtained as reported in Table 4-b. The highest percentage of fungi infection (14.22%) was noticed on untreated (control) Giza 5 variety seed, on contrast the fungi infestation (%) was decreased to the lowest value (4.65%) after treating seed of variety Giza 6 with fungicide vitavax.

Interaction between peanut varieties and packing materials had significant effect on fungi infection (%) as illustrated from results in Table 4-c. Packed seed of peanut variety Giza 5 in cloth bags had the highest percentage of fungi infestation (16.22%) on contrast, fungi infection (%) was reduced to the lowest percentage (3.46%) when Giza 6 variety seed was packed in polypropylene bags.

The Results in Table 4-d show that the effect of interaction between seed treatments and packing materials was significant. Fungi infection reached its highest percentage (20.58%) in untreated peanut seed which stored in cloth bags, on the other side, it decreased to the lowest percentage (4.31%) when treated with fungicide vitavax before storage in polypropylene bags.

**Table 4-a. Oil (%) of peanut seeds as affected by interaction between varieties (V) and packing materials (P) after 18 months from storage**

| Packing material<br>Variety | Cloth bags<br>(P1) | Polypropylene bags<br>(P2) | Aluminum bags<br>(P3) |
|---|---|---|---|
| | B | A | A |
| **Giza 6 (V1)** | 41.56 b | 42.89 b | 42.11 b |
| | A | A | B |
| **Giza 5 (V2)** | 44.26 a | 44.74 a | 43.76 a |

**Table 4-b. Fungi infection (%) of peanut seeds as affected by interaction between varieties (V) and seed treatments (T) after 18 months from storage**

| Seed treatment / Variety | Control (untreated) (T1) | Moringa (leaf extract) (T2) | Vitavax (fungicide) (T3) |
|---|---|---|---|
| | A | B | C |
| Giza 6 (V1) | 9.77 b | 5.55 b | 4.65 b |
| | A | B | C |
| Giza 5 (V2) | 14.22 a | 11.22 a | 6.45 a |

**Table 4-c. Fungi infection (%) of peanut seeds as affected by interaction between varieties (V) and packing materials (P) after 18 months from storage**

| Packing material / Variety | Cloth bags (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| | A | C | B |
| Giza 6 (V1) | 10.25 b | 3.46 b | 6.57 b |
| | A | C | B |
| Giza 5 (V2) | 16.22 a | 7.15 a | 8.18 a |

**Table 4-d. Fungi infection (%) of peanut seeds as affected by interaction between seed treatments (T) and packing materials (P) after 18 months from storage**

| Packing material / Seed treatment | Cloth bags (P1) | Polypropylene bags (P2) | Aluminum bags (P3) |
|---|---|---|---|
| Control (T1) | A | C | B |
| (untreated) | 20.58 a | 9.33 a | 11.16 a |
| Moringa (T2) | A | C | B |
| (leaf extract) | 13.52 b | 7.85 b | 9.16 b |
| Vitavax (T3) | A | C | B |
| (fungicide) | 8.86 c | 4.31 c | 6.83 c |

## REFERENCES

Ahmed, O., B.U. Olayinka, T. Garuba, J. Ahmed and E.O. Etejere (2017). Germination of several peanut cultivars in relation to incidence of fungi. Sci. World J., 12 (1): 38-41.

Al-Amod, M.O. (2015). Seed-borne fungi of some peanut varieties from Hadhramout and Abyan Governorates in Yemen. Int. J. Agric. Tec., 11 (6): 1359-1370.

Ali, A-G.A. (1979). Electrical and chemical evaluation of planting seed quality. Ph.D. Thesis Fac. Agric. North Carolina State Univ., USA.

Aliloo, A.A. and B. Shokati (2011). Correlation between seed tests and field emergence of two varieties hybrids (SC 704 and SC 500). Online J. Anim. and Feed Res., (Ojar), 1 (6): 249-254.

Amer, M.I., S.A. El-Sayed, O.A.M. El-Galaly and R.B. Abo Arab (2012). Influence of seed size and storage treatments on yield and quality of faba bean seeds. J. Agric. Res., Tanta Univ., 28 (1): 75-92.

Ankaiah, R., N.M. Reddy, K. Radhika and K.V.S.M. Kumari (2006). Effect of containers on storability of tomato seed (*Lycopersicon esculentum* L.) under ambient condition. Proc: XII National Seed Seminar at ANGRAU, Hyderabad during 24-26 Feb., 60.

AOAC (1984). Official Methods of Analysis of the Association of Official Agriculture analytical Chemists, 14th Ed, published by the Ass. of Official Chem., Washington, DC, 2044.

AOSA (1983). Association of Official Seed Analysis. Seed Vigor Testing Handbook. Contribution No. 32 to the Handbook on Seed Testing.

Aslam, M.F., G. Irshad, F. Naz, M.N. Aslam and R. Ahmed (2015). Effect of seed-borne mycoflora on germination and fatty acid profile of peanuts. Pak. J. Phytopathol., 27 (2): 131-138.

Awad, S.G., S.A.M. Attia, A.A. Bakr and A.O. Osman (1994). Effect of micronutrients-Vitavax interaction on peanut plant grown on sandy soil. Ann. Agric. Sci. Cairo, 39 (1): 227-237.

Bessa, J.F.V., J.R. Donadon, O. Resende, R.M.V. Alves, J.D.F. Sales and L.M. Costa (2015). Armazenamento do crambe em diferentes embalagens e ambientes: Parte I - Qualidade fisiológica. Revista Brasileira de Engenharia Agrícola e Ambiental, 19(3), 224-230,2015.http://www.scielo.br/pdf/ rbeaa/ v19n3/1415-4366-rbeaa-19-03-0224. pdf

Bhattacharya, K. and S. Raha (2002). Deteriorative changes of maize, peanut and soybean seeds by fungi storage. Mycopathologia, 155: 135-141.

Bindu, M.K. (1997). Evaluation of groundnut genotypes for storability of vigour. Seed Tech. News, 27 (3): 7-12.

Biradar, S. (2001). Influence of pre-harvest insecticidal spray on seed yield and quality and post harvest seed treatment on storability of green gram (*Vigna radiata* (L.) Wilczek). M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India).

Chowdhury, S., D.S.L. Mathur and S. Jayprakash (2003). Seed research on peanut under NSP crops. Proc. Nat. Workshop on Peanut Seed Technol., 6 (7): 6-19.

Deshpande, V.K., R.K. Sarwad and M. Shekaragouda (2003). Accelerated aging test –A tool to predict relative storability in peanut. Proc. Nat. Workshop on Peanut Seed Technol., 6 (7): 171-176.

Duncan, D. B. (1955). Multiple Range and Multiple F Tests. Biomet., 11:1.

Economic Affairs Sector (2015). Ministry of agriculture and land reclamation, Bulletin of the Agricultural Statics. Part (2).

El-Mohamedy, R.S.R. and M.A. Aboelfetoh (2014). Evaluation of antifungal activity of *Moringa oleifera* extracts as natural fungicide against some plant pathogenic fungi *In vitro*. J. Agric. Technol., 10 (4): 963-982.

El-Sayed, A.A.M. (2003). Effect of some agronomic treatments on yield and quality of peanut seeds (*Arachis hypogaea* L.). M.Sc. Thesis, Fac. Agric. Zagazig Univ.

Eraky, H.A.M. (2015). Influence of special seed treatments on field emergence and seedling growth of maize (*Zea mays*) varieties. M.Sc. Thesis, Fac. Agric., Zagazig Univ., Egypt.

Freedman, B., J. Noak and W.F. Kwolek (1979). A bioassay for plant derived pest control agent using the European corn borer. J. Entomol., 72:45-54.

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

Hashem, F.M., S.A. Saleh, P. van Berkum and M. Voll (1997). Survival of *Bradyrhizobium sp*. (*Arachis*) on fungicide-treated peanut seed in relationship to plant growth and yield. World J. Microbiol. and Biotechnol., 13:335-340

Ibrahim, E.A.M. and M.S. Abo El-Dahab (2016). Influence of seed dressing yeast extract and fungicides on seed quality of wheat during storage. Int. J. Tech. Res. and Sci., 1 (10): 319-327.

ISTA (1999). International Rules for Seed Testing. Handbook of Vigor Test Method. 3rd Ed., 22-35.

Janardhan, A., D. Subramanyam; A.P. Kumar, M.R. Pradeep and G. Narasimha (2011). Aflatoxin impacts on germinating seeds. Annul. Biol., 2: 180-188.

Kathmale, D.R., B.R. Najan and S.S. Ubale (2003). Seed viability studies in peanut. Proc. of Nat. Workshop on Peanut. Seed Technol., 6-7: 177-178.

Krishnappa, N., S. Narayanaswamy, R. Sreenavasa and C. Kumar (2001). Seed quality as influenced by natural storage and accelerated ageing in peanut cultivars. Mysore J. Agric. Sci., 35: 37-43.

Kurdikeri, M.B., K. Giriraj and M.S. Gouda (2003). Storage potential of peanut seeds under ambient conditions. In: Proceedings of National Workshop on Peanut Seed Technology, Ed. Agric. Sci. Univ., Campus, Raichur during February, 6 (7): 168-170.

Machado, K.M.G., C.A. Luciana, L.C.A. Compart, R.O. Morais, H. Luiz, L.H. Rosa and M.H. Santos (2006). Biodegradation of reactive textile dyes by Basidiomycetous fungi from Brazilian ecosystems. Brazilian J. Microbiol., 37:481-487.

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. Agri. Res., 33 : 469-477.

Meena, M.K., M.B. Chetti, C.M. Nawalagatti and M.C. Naik (2017). Vacuum Packaging Technology: a Novel Approach for Extending the Storability and Quality of Agricultural Produce. Adv. Plants Agric. Res., 7 (1): 00242. DOI:10.15406/ apar. 2017. 07.00242

MSTAT-C (1984). A computer Based Statistical Software Packages. Crop and Soil Sciences Department of Michigan State University of the United States.

Murali, M.R., S.D. Shashiclhara and B.S. Vyakaranahal (2002). Investigation on seed viability in black gram and green gram. J. Res. Angrau, 30: 34-39.

Musa, A.K., D.M. Kalejaiye, L.E. Ismailia and A.A. Oyerinde (2010). Proximate composition of selected peanut varieties and their susceptibility to *Trogoderma granarium* Everts attack. J. Stored Prod. and Postharvest Res., 1 (2) : 13-17.

Mutegi, C.K., J.M. Wagachal, M.E. Christie, J. Kimani and L. Karanja (2013). Effect of storage conditions on quality and aflatoxin contamination of peanuts (*Arachis hypogaea* L.). Int. J. Agric. Sci., 3 (10): 746-758.

Narayanan, G.S. and M. Prakash (2015). Influence of physical seed enhancement techniques on storability of sesame (*Sesamum indicum* L.) cv. VRI 1. Plant Archives 15 (1): 459-463.

Narayanaswamy, S. (2003). Effect of packaging and location of storage on peanut seed. Proc. Nat. Workshop on Peanut Seed Technol., 6 (7): 164-167.

Nataraj, K. and C. Jayaramegowda (2017). Effects of packaging materials and seed treatments chemicals on seed quality attribute in vegetable soybean during

Storage. Int. J. Curr. Microbiol. App. Sci., 6 (5): 1609-1614.

Nghiep, H.V. and A. Gaur (2005). Efficacy of seed treatment in improving seed quality in rice (*Oryza sativa* L.). Omonrice, 13: 42-51.

Nigam S.N; R.V. Ramanatha and R.W Gibbons (1983). Utilization of natural hybrids in the improvement of groundnuts (*Arachis hypogaea* L.). Expl. Agric., 19:355-359.

Nouman, W., M.T. Siddiqui and Sh.M.A. Basra (2012). *Moringa oleifera* leaf extract: An innovative priming tool for rangeland grasses. Turk. J. Agric For Rangeland Grasses, 36: 65-75.

Nwangburuka, C.C., K. Oyekale, C.N. Ezekiel, P.C. Anokwuru and O. Badaru (2012). Effects of *Moringa oleifera* leaf extract and sodium hypochlorite seed pre-treatment on seed germination, seedling growth rate and fungal abundance in two accessions of *Abelmoschus esculentus* (L) Moench. Arch. Appl. Sci. Res., 4 (2): 875-881.

Patra, A.K., S.K. Tripathy and R.C. Samui (2000). Effect of drying and storage methods on seed quality of summer peanut (*Arachis hypogaea* L.). Seed Res., 28 (1): 32-35.

Rafael, M.B., S.J. Faria, M.D. Lopes, R.D. Panzizzi and R. D. Vieira (2013). Chemical control of pathogens and the physiological performance of peanut seeds. J. Food, Agric. and Environ., 11 (2): 322-326.

Rajendraprasad, S., U.S. Ujjnaiah, R.A. Sathyanarayana and G.V. Jagadish (1998). Effect of genotypes of peanut kernels and containers on seed quality during storage. Seed Tech. News, 28 (4): 35.

Rashmireddy, P. (2003). Influence of provenance storage locations and containers on storability of rabi/summer peanut seeds. M.Sc. Ag. Thesis, Agric. Sci. Univ., Dharwad.

Santos, F., P.F. Medina, A. Lourenco, J.J. Parisi and I.J.D. Godoy (2016). Damage caused by fungi and insects to stored peanut seeds before processing. Bragantia, Campinas, DOI: http://dx.doi.org/10.1590/1678-4499.182.

Souza, G.F., S.A.G. Mossini, C.C. Arroteia, C. Kemmelmeier and M.M. Junior (2014). Evaluation of the mycroflora and aflatoxins from the pre-harvest to storage of peanuts: A case study. Acta Scientiarum, Agron., Maringa, 36 (1):27-33.

Sultana, N., I. Hossain and K. Akhter (2012). Comparative effect of seed treatment with bion, amistar and Vitavax-200 in controlling tikka disease of peanut var. Jhinga Badam. J. Expt. Biosci., 3(1) : 37 – 44.

Suriyong, S., N. Krittigamas, S. Pinmanee, A. Punyalueb and S. Vearasilp (2015). Influence of storage conditions on change of hemp seed quality. 1st Int. Conf. Asian Highland Nat. Res. Manag., Asia Hi Land.

Tame, V.T., D.T. Gungula and A.A. Sajo (2013). Speed of emergence of soybean (*Glycine max* L. Merr.) seeds stored in different materials and environmental conditions in Yola Nigeria. Int. J. Adv. Res., 1 (3): 86-89.

Tammanagouda, P. (2002). Influence of organics on seed yield, quality and storability studies in green gram cv. Chinamung. M.Sc. Thesis, Univ. Agric. Sci., Dharwad, Karnataka, India.

Verma, O. and R.S. Verma (2014). Effect of seed coating material and storage containers on germination and seedling vigour of soybean (*Glycine max* L.). SAARC J. Agri., 12 (2): 16-24.

Verma, S.S., R.P.S. Tomer and U. Verma (2003). Loss of viability and vigour in Indian mustard seeds stored under ambient conditions. Seed Res., 31: 98-101.

# تأثيـــر فتـــــرات وعبـــوات التخـــزين وبعـــض المعــــامـــلات علـــى جـــودة تقـــاوى الفـــول الســـودانى

مدحت المتولى الدرينى[١] - أحمد عبدالغنى على[٢] - إبراهيم فتحى مرسال[١] - السيد السيد أحمد السبكى[٢]

١- قسم بحوث تكنولوجيا البذور- معهد بحوث المحاصيل الحقلية- مركز البحوث الزراعية- جيزة - مصر

٢- قسم المحاصيل - كلية الزراعة - جامعة الزقازيق- مصر

أجريت تجارب واختبارات معمليه لدراسة تأثير معامله تقاوي الفول السوداني صنفي جيزة ٦ وجيزة ٥ وذلك بمستخلص أوراق المورنجا والمبيد الفطري فيتافاكس قبل التخزين في عبوات مختلفة (القماش - البولي بروبلين - ورق الألومونيوم) خلال الفترات (صفر، ٦، ١٢ و ١٨ شهر) بعد المعاملة على الإنبات وصفات قوة البذور والبادرات والإصابة الفطرية، ويمكن تلخيص أهم النتائج فيما يلى: وجود اختلافات في جودة بذور الصنفين جيزه ٦ و جيزه ٥ في نسبة الإنبات وقوة البذور والبادرات، واختبار التترازوليم – نسبة الزيت – اختبار التوصيل الكهربائي، وكذلك الإصابة الفطرية وكان التفوق لصالح الصنف جيزة ٦، وأثرت معاملات التقاوى تأثيرًا معنويا على إنبات البذور وصفات جودة البذور والبادرات والإصابة الفطرية، وأدت المعاملة بالمبيد الفطرى الفيتافكس إلى المحافظة على جودة التقاوى تلاها مستخلص أوراق المورنجا مقارنة بالكنترول كما عبر عنها بصفات إنبات البذور وقوة البذور والبادرات والإصابة الفطرية، أظهر نوع العبوات تأثيرا معنويا على إنبات البذور وصفات قوة البذور والبادرات والإصابه الفطرية حيث كانت البذور المعبأة في عبوات البولي بروبلين الأفضل في صفات جوده التقاوى تلاها البذور المخزنة فى عبوات ورق الألومونيوم وأخيرا عبوات القماش، تقترح هذه الدراسة: معامله تقاوي الفول السوداني بالمبيد الفطري فيتافاكس والتخزين في عبوات البولي بروبلين وذلك للمحافظة على جوده التقاوي وتقليل الإصابة الفطرية أثناء التخزين وكذلك مراعاة اختلافات الأصناف فيما بينها من حيث الجودة والقدرة التخزينية.

---

**المحكمـــــون:**

**١- أ.د. مها محمد عبداللـــه** أستاذ المحاصيل – كلية التكنولوجيا والتنمية – جامعة الزقازيق.

**٢- د. محمد عبدالسلام طه** أستاذ المحاصيل المساعد – كلية الزراعة – جامعة الزقازيق.