J. Plant Production, Mansoura Univ., Vol. 2 (8): 995 - 1007, 2011

EFFECT OF MALATHION AND PLANT EXTRACTS ON SEED QUALITY OF SOME WHEAT VARIETIES (*Triticum aestivum,L.*) DURING STORAGE

Mersal, I. F.; Abeer El-Ward A. Ibrahim and A. A. M. El- Emam
Seed Tech. Res. Sec. Field Crops Res. Institute, A.R.C.

ABSTRACT

The role of some plant extracts such as scran and nerium, malathion and the mixture of them in protecting wheat seed from storage insects (*Sitophilus oryzae L.,*) and keeping its quality during storage is demonstrated. The objective of this study was to determine the effect plant extracts, malathion and the mixture of them on protecting seed of some wheat varieties (Sakha 93,Gemmiza 10 and Giza 168) from storage insects (*Sitophilus oryzae L.,)* as well as its effects on seed quality and insect infestation during different storage periods (0, 6 and 18 months). The main results revealed that: Treating rice weevils with the recommended dose of malathion resulted 100% mortality, meanwhile treating rice weevils with (half dose of malathion+ scran or nerium ethanol extract) increased mortality percentage more than scran, nerium extracts or half dose of malathion. Extend storage period after treatment for 6 and 18 months increased gradually insect infestation and seed dry weight loss and decreased germination percentage, seed and seedlings vigour and carbohydrate percentage, meanwhile seed protein percentage increased with prolong the storage period. Seeds of wheat variety 168 were the least in insect infestation and seed dry loss percentages comparing varieties Gemmiza 10 and Sakha 93. Treating wheat seed with the recommended dose of malathion or mixed with plant extracts or half dose mixed with plant extracts maintains high seed quality comparing the untreated seed. Generally, seeds of wheat varieties (Giza 168, Sakha 93 and Gemmiza 10) could be store for 18 months with maintain good quality seed by treating with malathion (recommended dose) or half dose mixed with nerium or scran extracts.

INTRODUCTION

In Egypt, high losses due to insect infestation are taken place in stored wheat (*Triticum aestivum,L.*) seed. The main reason for such problem is that wheat crop after harvesting and threashing is almost stored in the open air (common storage). Under these conditions, the quantity and quality of wheat seed are reduced (Madrid *et al.*, 1990). (Yadav *et al*,1968) study the germination of wheat seed damaged by rice weevil. The rice weevil, is the most widespread and destructive major insect pest of stored cereals throughout the world female rice weevil development inside the seeds and emerge as adults. Also (Girish *et al,* 1976) demonstrated that, the actual losses of grains that recorded during storage were mainly due to insect pests, and the loss in seed viability after storage for 6 months varied from 70 to 22%. Several investigators recommended the importance of using chemical insecticides to control the pests of stored grains, El- Hamady *et al*, 1999 and Snelson, 1987, suggested malathion and the fumigant phosphine for controlling insect pests in wheat grain storage. Tahir *et al.* (1992) assessed the toxicity of malathion against rice weevil, they reported that the LD_{50} were 1.04 mg/cm2 paper. But chemical insecticides have serious draw backs such as genetic resistance, toxic residues, worker safety, increasing costs of application and decreasing seed viability. Benhalima *et al.*2004 stated that rice weevil has been reported to developed resistance to synthetic insecticides, they found that germination due to damage by rice weevil was significantly affected.

Considerable efforts have been focused on plant derived materials, potentially useful as commercial insecticides cause smaller environmental impact (Garcia– Correia, 2002 and Arnason *et al.*1989). Insecticidal activity of many plants against several insect pests has been demonstrated (Isman, 2000; Carlini and Gross-De- Sa, 2002). The deleterious effects of plant extracts or pure compounds on insects can be manifested in several manners including toxicity, repellent effect, can work as phages restrainer and can affect the insects hormonal system (Hill,1990). Egyptian henban (Hyoscyamus muticus *L.*) and Plants of the genus Hyoscyamus are especially rich in alkaloids (Harborne and Baxter 1993). The plant extracts have potential substances for pest control (Golob *et al*, 1999; Belmain *et al*, 2001). These alkaloids exhibit a wide range of pharmacological and toxic activities (Southon and Buckingham 1989; Harborne and Baxtesr 1993). Genus Nerium is represented mainly by one species, viz., *Nerium oleander L.* all parts of the oleander plant are poisonous (contains three glycoside). Abo El-Ghar and El-Sheikh (1987) found that the N. oleander extract provided 94% seed protection against insect infestation.

The loss in seed viability increased with increasing storage period (Girish *et al.*, 1976 and Odiemah 1987). El- borai *et al.*(1993) found that increasing storage period from 6 to 30 months decreased the germination percentage and emergence from 85% to 10%, and also seedling lengths and dry weight were decreased during storage. Mersal *et al.*(2006) studied the effect of storage period on wheat seed quality. The results revealed that prolonging storage period reduced germinability, seedling vigor and accelerated aging germination. Meanwhile, prolonging storage period increased mean germination time, electrical conductivity and dry weight losses of the seed. Malaker *et al.*, (2008) found that seed germination decreased with the increase of storage period.

The aim of the present study was to evaluate the role of some plant extracts scran ethanol, nerium ethanol, malathion and the mixture of them in protecting seed of some seed wheat varieties (Sakha 93 , Gemmiza 10 and Giza 168) from storage insects (*Sitophilus Oryzae L.,)* as well as its effects on seed quality and insect infestation during different storage periods (0 , 6 and 18 months).

MATERIALS AND METHODS

This study was carried out at the Laboratory of Mansoura Seed Technology Research Unit, Dakhlia Governorate during 2009 and 2011 years.

Table 1, clear the English, Latin and Family names in addition to parts used and source of collection for the studied plants as insecticides.

Table 1 : Tested plant materials

English name	Latin name	Family name	Tested part	Source
*Egyptian Henbane	*Hyosyamus muticus,L.,*	Solanaceae	Aerial parts	EL-Arish
*Oleander	*Nerium oleader, L.,*	Apocynaceae	Aerial parts	EL-Arish

Plant samples were collected during spring 2009 and identification of plants was verified in Botany Department, Faculty of Science, Mansoura University) and identification was bases mainly on the taxonomic characters detailed by Tackholm (1956). The tested plants were extracted according to the procedures outlined by Freedman *et al.* (1979) with some modification, the aerial parts of the tested plants were dried and grinded using laboratory grinder into fine powder and 250 g of powder were extracted three times successively with ethanol solvent. The homogenous extract was allowed to stand for three days and extracts were filtered through an hydrous sodium sulphate combined and the solvent was evaporated under vacuum at temperature degree not accessed 50C^{o}. The crude extract was then weighed and adjusted to 25 ml with the used solvent and kept in Refrigerator until testing. The tested insects of *Sitophilus oryzae. L.*, were identified in the Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt. The Treated Surface Exposure method of bioassay was used to evaluate the toxicity effect of the plant extract , malathion and mixture of them against *Sitophilus oryzae. L.,.* LC_{50} scran ethanol, LC_{50} nerium ethanol, recommended dose of malathion, half dose of malathion, LC_{50} of scran ethanol + malathion, LC_{50} scran ethanol + half dose of malathion, LC_{50} nerium ethanol + malathion, LC_{50} nerium ethanol + half dose of malathion. Serial concentrations of crude plant extract were prepared then 1 ml of each concentration was sprayed on the bottom of dishes. After the solvent had evaporated, newly hatched insects were placed in each dish covered and kept at room temperature for 24 hours, then mortality percent was counted, three replicates with 10 individuals were used for each concentration in addition to untreated check (control) free from toxicant. Mortality readings was corrected according to Abbott(1925).

Seed sample of wheat varieties were (Sakha 93, Gemmiza 10 and Giza 168) were obtained from Seed Production Administration, Ministry of Agriculture (without any pesticide treatment) and they were sieved and cleaned from any inert materials and treated with the following treatments: recommended dose of malathion (8%), half dose of malathion (4 %), Scran ethanol extract (LC_{50} =3193.02ppm), nerium ethanol extract (LC_{50}= 6085.77ppm), (Scran ethanol extract + malathion), (nerium ethanol extract + malathion), (Scran ethanol extract + half dose of malathion), (nerium ethanol extract + half dose of malathion), in addition to the check treatment (untreated). Then, the treated samples were dried in open-air and the studied traits were recorded, other samples treated and stored in cloth bags in open air under the laboratory conditions for 6 month and others treated and stored for 18 month.

Studied traits :

Insect infestation percentage.

Each sample after storage period (0, 6 and 18 month) was inspected while, three replicates of 100 seeds from each sample were used to estimate insect infestation. The infestation level was expressed as percent damage seed according to Jood *et al.*,(1996).

Insect infestation percentage = No. infested seed /No. of inspected seed× 100.

Seed dry weight loss percentage: was calculated according to Dick. (1987).

Germination percentage: Germination percentage was performed according to (ISTA,1985), while 400 seeds of wheat in three replicates were sown at $20C^o \pm 2$ in sterilized sand culture. Germination percentage defined as the total number of normal seedling at the end of the test after eight days..

Accelerated aging germination test:- (germination after seed aging): Accelerated aging test was performed according to (ISTA, 1985). Each sample of 400 seeds were placed in an accelerate aging chamber at 40Co and 100% relative humidity for 48 hour. After this exposure period, the seed sample was submitted to the standard germination test.

Electrical conductivity:- It was calculated according to Matthews and Alison (1987). Fifty seeds in three replicates were weight to 2 decimal places and placed in a 250 ml flask and 250ml of distilled water was added . The flasks were covered and placed in an incubator at a constant temperature of $20C^o$ for 24 hours , after which the contents of the flasks were gently stirred. The electrical conductivity was measured in the solution after removing the seeds. The HANNA conductivity meter(Hi 80333) was used. The results were reported as *(mmhos/g/seed).*

Seedling dry weight: Ten normal seedlings were dried in a hot air oven at $85C^o$ for 12 hours (Kirshnasamy and Seshu, 1990) and then weighted in (g).

Seed protein percentage : Estimated according to the improved Kildahl method of AOAC, (1999).

Seed carbohydrates content: Measured according to Hedge and Hofreiter, (1962).

Statistical analysis:-

Data were statistically analyzed as the technique of the ANOVA for the Randomized Complete Block Design. The treatment and means were compared using the Least Significant Differences (LSD) according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Results in Table 2 clearly showed that effect of the treatments on mortality percentage of *Sitophilus oryzae L.,* using residue film technique. No mortality occurred in adult fed with control diet after 48 hours from treatment. Maximum mortality (100%) caused by the recommended dose of malathion followed by scran ethanol + malathion, nerium ethanol+ half does of malathion, nerium ethanol + malathion and Scran ethanol+ half does of malathion. Treated insects with nerium ethanol extract produced the lowest percentage of mortality (45%) and followed by half dose of malathion. These results agree with Tahir *et al.*, 1992 they assessed the toxicity of malathion against rice weevils, also the effect of plant extracts on rice weevils may be refer to its potential substances for best control such as alkaloids in Egyptian henban while, Southon and Buckingham 1989; Harborne and Baxter 1993 mentioned its toxic activities, also Abo El-Ghar and El-Sheikh (1987) found that the N. oleander extract provided 94% seed protection against insect infestation.

Table 2: Effect of seed treatments on adult of *Sitophilus oryzae, L.* using residue film technique.

Treatments	Mortality %
Control	0
Recommended does of malathion	100
Half does of malathion	50
Scran ethanol	65
Nerium ethanol	45
Scran ethanol + malathion	90
Nerium ethanol + malathion	80
Scran ethanol+ half does of malathion	75
nerium ethanol+ half does of malathion	85

Significant effect on wheat seed insect infestation for the interaction among storage periods, wheat varieties and seed treatments as illustrated in Table 3, wheat seeds were free from insect infestation directly after treatment. Treating wheat seed with the recommended dose of malathion (8%), scran + malathion and nerium + malathion protect wheat seed of all the tested wheat varieties from insect infestation for six months. On contrast, untreated wheat seed for all tested varieties had the highest level of insect infestation and the infestation level of the tested variety Gemmiza10 was the highest, the infestation levels for wheat variety Giza 168 was low comparing with Sakha 93 and Gemmiza10 varieties. Insect infestation level, after 18 months from storage for the untreated seed of tested varieties reached its high levels and the infestation level of variety Giza 168 was low followed by Sakha 93 and Gemmiza10, on the other hand, treating wheat seed with the recommended dose of malathion, scran + malathion, nerium + malathion and sacran + half dose of malathion produced the lowest means of insect infestation. From these results, seeds of tested wheat varieties which treated with recommended dose of malathion, scran + malathion, nerium + malathion were free from insect infestation after 6 months while these materials protected wheat from infestation and this may refer to its toxic activity consequently after 18 months the infestation level was less than the untreated seed, also lessening insect infestation of variety Giza 168 may refer to its chemical components as presented in Tables 9 and 10. These results consent with Abo El-Ghar and El-Sheikh (1987) and Tahir *et al.*, 1992.

Table 3: Effect of interaction among storage periods, wheat varieties and seed treatments on insect infestation percentage.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	0.0	0.0	0.0	7.2	8.2	6.2	13.5	14.5	12.5
Recommended does of malathion	0.0	0.0	0.0	0.0	0.0	0.0	8.0	9.0	7.0
Half does of malathion	0.0	0.0	0.0	7.0	8.0	5.7	14.o	14.0	12.0
Scran ethanol	0.0	0.0	0.0	7.0	7.0	5.3	13.0	14.0	12.0
Nerium ethanol	0.0	0.0	0.0	7.0	8.0	6.1	13.7	14.0	13.0
Scran ethanol + malathion	0.0	0.0	0.0	0.0	0.0	0.0	8.8	9.0	8.0
Nerium ethanol + malathion	0.0	0.0	0.0	0.0	0.0	0.0	9.0	10.0	9.0
Scran ethanol+ half does of malathion	0.0	0.0	0.0	2.7	3.0	2.33	8.7	8.7	8.3
nerium ethanol+ half does of malathion	0.0	0.0	0.0	4.3	3.7	2.3	9.7	11.0	7.7
L.S.D at 0.05%	0.7								

Results in Table, 4 show that seed dry weight loss percentage was significantly affected by the interaction among different treatments. After storage for six months, wheat samples which treated with the recommended dose of malathion or (scran and nerium with malathion) did not record any loss in seed dry weight. On contrast, seed dry weight loss for the untreated wheat samples of Sakha 93, Gemmiza10 and Giza 168 was 2.9%, 3.1% and 2.6%, respectively. On the other side, with store wheat seed for 18 months as (carry over seed) seed dry weight loss for the untreated wheat samples was 7.9% for Sakha 93 variety, 8.1% for Gemmiza10 variety and 7.6% for Giza 168 variety, but treated seed with the recommended dose of malathion and (scran + malathion) had the lowest percentages of seed dry weight loss due to insect infestation, these were for all the tested varieties Sakha 93, Gemmiza10 and Giza 168.

Table 4: Effect of interaction among storage periods, wheat varieties and seed treatments on seed dry weight loss percentage.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	0.0	0.0	0.0	2.9	3.1	2.6	7.9	8.1	7.6
Recommended does of malathion	0.0	0.0	0.0	0.0	0.0	0.0	3.6	3.7	3.2
Half does of malathion	0.0	0.0	0.0	2.3	2.4	2.0	7.9	8.0	7.8
Scran ethanol	0.0	0.0	0.0	1.9	2.0	1.9	7.9	7.9	7.8
Nerium ethanol	0.0	0.0	0.0	2.4	2.6	2.0	7.9	8.2	7.9
Scran ethanol + malathion	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.9	3.4
Nerium ethanol + malathion	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.5	3.9
Scran ethanol+ half does of malathion	0.0	0.0	0.0	1.8	1.8	1.7	4.7	5.2	3.9
nerium ethanol+ half does of malathion	0.0	0.0	0.0	1.9	1.9	1.6	5.3	5.6	4.7
L.S.D at 0.05%	0.2								

Also, as illustrate from these data, seed dry weight loss for wheat variety Giza 168 was the least after six and eighteen months from storage followed by Sakha 93 and Gemmiza10, this may be refer to the level of insect infestation while the infestation level increased seed dry weight loss by insects increased. This agree with Mersal *et al.*, (2006), they mentioned that increasing storage period increase insect infestation level and seed dry weight loss.

Data in Table 5, show that germination percentage of wheat seed significantly affected by the interaction among storage periods, wheat varieties and seed treatments. Directly after treating wheat seed with malathion, plant extracts or plant extracts plus malathion, insignificant effects between these treatments on seed germination. This indicate that, these treatments did not had any harmful effects on seed germination. After six months from treatment, significant effects were observed and the lowest percentages of germination recorded from untreated seed of varieties Sakha 93 and Gemmiza10. On the other side, treated seed of variety Giza 168 with the (recommended dose of malathion, scran + malathion and scran + half dose of malathion) had the highest percent of germination 96%. With prolonging the storage period for 18 months (for the next season as carry over seed), seed germination for the untreated seed of varieties Sakha 93, Gemmiza10 and Giza 168 did not reach the acceptance level for the certified wheat seed (85%). Meanwhile germination percentage of the treated seed of the studied varieties by recommended dose of malathion and treated seed of variety Giza 168 with (scran + malathion and scran + half dose of malathion) surpassed other treatments in germination percentage. The reduction in seed germination, seed and seedlings might be due to increasing storage periods wheat seeds might be infested by storage pests (insects and fungi) or might refer to the increase of consumption of some organic compounds in respiration process with increasing storage periods.

Table 5: Effect of interaction among storage periods, wheat varieties and seed treatments on wheat seed germination percentage.

Varieties	Storage periods/months								
	0			6			18		
Seed treatments	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	97	98	98	90	90	94	72	72	74
Recommended does of malathion	98	98	100	94	94	96	86	86	86
Half does of malathion	96	96	97	92	92	93	73	72	74
Scran ethanol	97	96	97	92	91	94	77	74	80
Nerium ethanol	96	96	97	92	88	93	75	74	78
Scran ethanol + malathion	98	98	100	94	93	96	84	83	86
Nerium ethanol + malathion	97	98	98	94	92	95	84	84	84
Scran ethanol+ half does of malathion	97	98	98	92	93	96	84	84	85
nerium ethanol+ half does of malathion	97	97	97	93	93	95	83	84	84
L.S.D at 0.05%	1.8								

Similar results reported by Girish *et al.*, (1976), Odiemah (1987). and Mersal *et al.*(2006)

Insignificant effects on germination after accelerated aging test for the interaction among storage periods, wheat varieties and seed treatments were found as presented in Table 6.

Table 6: Effect of interaction among storage periods, wheat varieties and seed treatments on wheat seed germination percentage after accelerated aging.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	81	81	81	72	71	74	52	52	54
Recommended does of malathion	83	83	83	75	75	76	60	60	60
Half does of malathion	81	81	82	72	72	74	50	51	52
Scran ethanol	82	81	82	73	73	75	52	54	56
Nerium ethanol	81	81	82	72	71	74	50	50	52
Scran ethanol + malathion	83	83	83	74	75	77	58	59	60
Nerium ethanol + malathion	82	83	83	73	74	76	58	59	59
Scran ethanol+ half does of malathion	82	83	83	73	73	76	56	57	58
nerium ethanol+ half does of malathion	82	82	82	73	74	75	58	57	59
L.S.D at 0.05%	NS								

Results in Table 7, show significant effect on seedlings dry weight for the interaction among storage periods, wheat varieties and seed treatments. At the first storage period, the differences between treatments did not reach the significant level at 0.05%. On the other side, at the second storage period the differences between treatments reached the significant levels at 0.05%, treated seed with the recommended dose of malathion and treated seed of varieties Sakha 93 and Giza 168 with nerium + malathion had the heaviest dry weight of seedlings. On contrast the low seedlings dry weight resulted from untreated seed of varieties Sakha 93 and Gemmiza10. With extend storage period for 18 months, further decrease in seedlings dry weight was noticed for untreated samples and most treatments except for the treated seed of variety Giza 168 by the recommended dose of malathion and treated seed with nerium + malathion. In general, seedlings dry weight decreased with prolonging storage period from 6 to 18 months. This was a result of decreasing seedling vigour with increasing the storage period.

Results in Table 8, show significant effect for the interaction among storage periods, wheat varieties and seed treatments on electrical conductivity of seed leached. Directly after treating wheat seed with the studied materials as pesticides, electrical conductivity of the seed leached ranged between o.o25 and o.o28 *mmhos/g/seed* for all the tested varieties. After six months from storage, untreated seed had the highest means of electrical conductivity readings and we noticed that Giza 168 variety had the lowest reading comparing untreated seed of varieties Sakha 93 and Gemmiza10. On the other side, treating wheat seed with scran + malathion and recommended dose of malathion, readings of electrical conductivity for wheat variety Giza 168 were the lowest.

Table 7: Effect of interaction among storage periods, wheat varieties and seed treatments on seedlings dry weight of wheat.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	0.61	0.60	0.61	0.44	0.44	0.46	0.33	0.33	0.35
Recommended does of malathion	0.61	0.61	0.61	0.54	0.52	0.54	0.41	0.44	0.46
Half does of malathion	0.61	0.60	0.61	0.44	0.46	0.47	0.38	0.39	0.39
Scran ethanol	0.61	0.61	0.61	0.45	0.46	0.47	0.35	0.36	0.38
Nerium ethanol	0.61	0.61	0.61	0.45	0.46	0.48	0.39	0.40	0.39
Scran ethanol + malathion	0.61	0.60	0.61	0.50	0.50	0.53	0.37	0.37	0.39
Nerium ethanol + malathion	0.60	0.60	0.61	0.54	0.53	0.54	0.40	0.44	0.45
Scran ethanol+ half does of malathion	0.60	0.61	0.61	0.49	0.51	0.53	0.36	0.38	0.38
nerium ethanol+ half does of malathion	0.60	0.61	0.60	0.47	0.46	0.49	0.36	0.36	0.38
L.S.D at 0.05%	0.01								

Table 8: Effect of interaction among storage periods, wheat varieties and seed treatments on Electrical conductivity of leached seed (*mmhos/g/seed*).

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	0.026	0.027	0.027	0.047	0.047	0.039	0.096	0.096	0.092
Recommended does of malathion	0.027	0.027	0.027	0.031	0.032	0.029	0.066	0.064	0.062
Half does of malathion	0.025	0.028	0.026	0.046	0.045	0.039	0.094	0.096	0.089
Scran ethanol	0.027	0.027	0.027	0.042	0.042	0.039	0.090	0.092	0.087
Nerium ethanol	0.027	0.027	0.028	0.045	0.048	0.041	0.094	0.099	0.090
Scran ethanol + malathion	0.025	0.026	0.026	0.031	0.033	0.027	0.066	0.064	0.066
Nerium ethanol + malathion	0.025	0.026	0.027	0.032	0.031	0.031	0.074	0.078	0.068
Scran ethanol+ half does of malathion	0.025	0.028	0.027	0.035	0.036	0.030	0.081	0.081	0.079
nerium ethanol+ half does of malathion	0.027	0.026	0.027	0.040	0.041	0.035	0.089	0.089	0.084
L.S.D at 0.05%	**0.02**								

With prolong the storage period up to 18 months, untreated wheat seed had the highest means of electrical conductivity readings and it followed by the treated seed with half dose of malathion and scran extract. Increasing electrical conductivity readings of leached wheat seed with increasing storage period refer to the reduction in seed viability with prolong the storage period. Similar results obtained by Mersal *et al.*(2006)

Data in Tables, 9 and 10 show, the interaction among storage periods, wheat varieties and seed treatments had insignificant effect on seed chemical composition as measured by (protein and carbohydrate contents).

Table 9: Effect of interaction among storage periods, wheat varieties and seed treatments on seed protein percentage.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168	Sakha 93	Gem. 10	Giza 168
Control	**11.4**	**10.9**	**12.1**	**11.5**	**11.1**	**12.3**	**11.6**	**11.2**	**12.5**
Recommended does of malathion	**11.3**	**10.9**	**12.2**	**11.4**	**11.04**	**12.3**	**11.4**	**11.1**	**12.4**
Half does of malathion	**11.4**	**10.9**	**12.2**	**11.4**	**11.0**	**12.3**	**11.5**	**11.1**	**12.4**
Scran ethanol	**11.3**	**10.9**	**12.2**	**11.4**	**11.1**	**12.3**	**11.5**	**11.4**	**12.4**
Nerium ethanol	**11.3**	**11.2**	**12.2**	**11.4**	**11.1**	**12.3**	**11.4**	**11.1**	**12.4**
Scran ethanol + malathion	**11.4**	**10.9**	**12.2**	**11.4**	**11.0**	**12.2**	**11.4**	**11.1**	**12.43**
Nerium ethanol + malathion	**11.4**	**10.9**	**12.2**	**11.4**	**11.0**	**12.2**	**11.5**	**11.1**	**12.4**
Scran ethanol+ half does of malathion	**11.3**	**10.9**	**12.2**	**11.4**	**11.1**	**12.2**	**11.5**	**11.2**	**12.4**
nerium ethanol+ half does of malathion	**11.4**	**10. 9**	**12.2**	**11.4**	**11.0**	**12.3**	**11.5**	**11.2**	**12.4**
L.S.D at 0.05%	**NS**								

Table 10: Effect of interaction between storage periods, wheat varieties and seed treatments on seed carbohydrate percentage.

Varieties / Seed treatments	Storage periods/months								
	0			6			18		
	Sakha 93	Gem.10	Giza 168	Sakha 93	Gem.10	Giza 168	Sakha 93	Gem.10	Giza 168
Control	73.7	71.3	69.9	70.1	68.6	66.7	67.9	66.1	62.9
Recommended does of malathion	73.8	71.3	69.8	71.8	69.9	67.4	68.5	67.1	65.6
Half does of malathion	73.8	71.2	69.3	71.2	68.2	66.4	67.5	66.1	64.5
Scran ethanol	73.6	71.6	69.7	70.3	68.4	66.1	67.8	66.8	64.6
Nerium ethanol	73.7	71.7	69.1	70.5	68.2	66.0	67.9	67.0	65.4
Scran ethanol + malathion	73.6	71.6	69.6	71.3	69.8	67.3	68.5	66.9	65.6
Nerium ethanol + malathion	73.5	71.3	69.7	71.0	69.8	67.1	68.1	66.8	65.4
Scran ethanol+ half does of malathion	73.6	71.2	69.3	70.8	68.6	66.9	67.9	66.3	64.5
nerium ethanol+ half does of malathion	73.7	71.7	69.3	70.7	68.6	66.7	68.1	64.9	64.7
L.S.D at 0.05%	NS								

Although synthetic pesticides recommended for control storage pests, but their use may create toxicity to other organisms, development of pest resistance and residues in treated seed. To alleviate insects pest problems in storage, there is a wide interest have been focused on plant derived materials, cause smaller environmental impact but its effective time is short comparing to the synthetic pesticides (malathion), so treating stored seed with pesticide (malathion) + plant extract or half dose of pesticide (malathion) + plant extract for treating wheat seed before storage may reduce the disadvantages of using malathion or plant extracts separate. From the former results wheat seed could be protected from storage insects by treating before storage with (malathion + scran extract), (malathion + nerium extract) or (half dose of malathion + scran extract).

REFERENCES

Abbott, W. S.(1925). A method of computing the effectiveness of an insecticide. J. Econ Entomol.,18: 265-367.

Abo-El-Ghar, G. E. E. and A. E. El Sheikh (1987). Effectiveness of some plant extracts as surface protectants of cowpea seeds against the beetle, *Callsobruchus chinensis*. Phytoparastica, 15(2) ,1-4

A.O.A.C. (1999). Official methods of analysis 8thEd. Association of Official Agriculture Chemists , Washington, D.C.

Arnason, J. T.; B.J. R. Philogene and P.Morand (1989). Insecticides of plant origin American Chemical Society Symposium Series Vol., 387 Washington.

Belmain, S. R.; G. E. Neal; D. E. Ray and P. Golob (2001). Insecticidal and vertebrate toxicity associated with ethanol botanicals used as post-harvest protectants in Ghana. Food Chemistry Toxicology, 39, 287-291.

Benhalima, H. ; M. Q. Choudhary ; K. A. Millis and N. Price (2004). Phosphine resistance in stored product insect collected from various grain storage facilities. J. of Stored Product Research 40(3). 241-249.

Bughio F. M. and R. M. Wilkins (2004). Influence of malathion resistance status on survival and growth of *Tribolium Castaneum l.,* (Coleoptera Tenebrionidae),when fed on flour from insect- resistant and susceptible grain rice cultivars. J. of Stored Products Research. 40 (1): 65-75.

Carlini, C. R. and M. F. Grossi De-Sa (2002). Plant toxic proteins with insecticidal properties,. A review on their potentialities as bio-insecticides. Toxicon, 40: 1515-1539.

Dick, K.M. (1987). Pest management in stored groundnuts. ICRISAT information Bulletin No. 22, Patancheru, Hyderabad, India.

El-Borai, M. A.; Nadia, A. El-Aidy and M. I. El-Emery (1993). Effect of different storage period on seed quality of three soybean cultivars, J. Agric. Mansoura, Univ. 18(8): 2206-2211.

EL- Hamady, E. ; E. S. ; R.P.S. Abo- Arab ; F.A. EL-zeir and,E.A. Amer (1999). Storage of pesticide treated maize seed : Effect of insect infestation , viability of seed and the safe utility of redundant seeds as poultry feed. 2nd int. conf. of pest control, Mansoura. Egypt sept.,67-88.

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.

Garcia- Correia, M. A. (2002) . Bioatividade da Ervo- de- Sant- Morio, *Chenopodium ambrosioides L.,* (Chenopodiaceae), emrelacao a *Sitophilus zeamais Mots.,* 1985 (Col.: Curculionidae) Dissert (Mestrado). Area de concentracao; Entomologia, U S P, Brasil.

George, G. and R. J. Patel (1992) . Mint, menthe spicate apromising botanical for green gram against pulse beetle, callosobruchus analis F. Indian. J. of Plant Protection 20 (1): 66-69.

Girish, G.K.; B.P. Tripathi ; R.P.S. Tomer and K. Krishnamuthy (1976) . studies on the assessment of losses, IV. Conventional grain storage practices and losses in rural areas in Utter Pradesh Rev. of App. Entomol.; series A,64 (7) :1241.

Golob, P.; C .Moss; M. Dales; A. Fidgen and J. Evans (1999) . The use of spices and medicinal as bioactive protectants for grains. FAO Agricultural Services Bulletin, 137.

Gomez, K.A. and A. A. Gomez (1984) . Statistical procedures for agricultural research. 2ndEd. John Whley & Sons.

Harborne, J. B. and H. Baxter (1993): Phytochemical dictionary .A hand book of bioactive compounds from plants " Taylor and Francis L td, pp., 300-308.

Hedge, J. E. and B.T. Hofreiter (1962). Carbohydrate chemistry 17(Eds Whistler R. L. and Be Miller, J. N) Academic Press New York.

Hill, D. S. (1990). Pest of stored products and their control. London, Brit. Library, 274p.

Isman, M. B. (2000). Plant essential oils for pests diseases management. Crop Prot. 19: 603-608.

I.S.T.A. (1985). International rules for seed testing. Seed Science and Technol., 13(2): 421-463.

Jacka, L. E. N. and R. A. Daoust (1986). Insect pests of cowpea, Annual Review of Entomology. 31: 95-119.

Jood, S.; A.C.Kapoor and S. Ram (1996). Evaluation of some plant products againt *Trigoderma granarium,Evarts* in sorghum and their effects on nutritional composition and oranoleptic characteristics J. Stored Prod. Res., 32(24): 345-352.

Kirshnasamy, V. and D. V. Seshu (1990). Phosphine fumigation influence on rice seed germination and vigor. Crop Sci. 30: 28-35.

Madrid, F.J.; N.D.G. White and S.R. Loschiavo (1990). Insects in stored cereals, and their association with farming practices in southern Manitoba. The Canadian Entomologist 122, 515–523.

Malaker, P. K.; I. H. Mian; K. A. Bhuiyan; A. M. Akanda and M. M. A. Reza (2008). Effect of storage period containers and time of seed quality of wheat . Bangladesh J. Agric. Res. 33(3): 469-477.

Odiemah, M. (1987). Germination and vigour of wheat seed comportment at different periods of storage. Acta-Agronomica-Hungarica., 36 (3-4): 303-308.

Matthews, S. and A.P. Alison (1987). Electrical conductivity test methods(2nd edition), 37-43 published by ISTA.

Mersal, I. F.; A. A. M. El-Emam and Amal, H. Selim (2006). Effect of storage period, seed moisture content and insecticides treatment on wheat (Triticum aestivium L.,) seed quality, Annals of Agric. Sci. Moshtohor, 44(1): 111-124.

Petar, K. and P. Ilija (2006). Susceptibility to contact insecticides of granary weevil (Sitophilus Granarius,L.) (Coleoptra: Curculionidae) Originating from different locations in the farmer Yugoslavia, J. of Stored Products Research, 42 (2): 149-161.

Riberio, M. B. ; R.N.C. Gudes; E.E. Oliveira and J.P. Santos (2003). Insecticide resistance and synergism in Brazilian populations of Sitophilus Zeamais (Coleoptra Curculionidae). J. of Stored Products Research, 39(1) 21-31.

Snelson, J.T. (1987). Grain Protectants. Australian Centre for International Agricultural Research, Canberra.

Southon, I. W. and J. Eds. Buckingham (1989). Dictionary of alkaloids. Chapman and Hall LTd., London.
Tackholm, V. (1956). Students flora of Egypt. Published by Anglo. Egyptian Book. Shop, Cairo.
Tahir, S. ; T. Anwar and S. N. H. Nagvi (1992). Toxicity and effects of novel pesticides against rice weevil, *Sitophilus Oryzae L.,* (Coleoptera: Curculionidae). Pakistan, J. of Zool., 24 (2) 111-114. (C. F. Rev. of Agric. Entomol. 1993, 81 (7): 754-
Yadav, T. D. ; P. Sircar and M.G. Jotwani (1968). Studies on insect damage and germination of seeds I U . Germination of wheat, Jowar and maize seeds damaged by the developing groups of *Sito philus oryzae L.,* and *Rhiozopertha dominica F..* Ind. J. Entomol. 30 (1) 83-84.

تأثير الملاثيون والمستخلصات النباتية على جوده بذور بعض أصناف القمح أثناء التخزين

إبراهيم فتحي مرسال ، عبير الورد أحمد إبراهيم و أحمد عبد اللطيف محمد الإمام
قسم بحوث تكنولوجيا البذور- معهد بحوث المحاصيل الحقلية- مركز البحوث الزراعية

تهدف هذه الدراسة لتقييم فاعلية مبيد الملاثيون ومستخلصات الايثانول لكلا من نباتي النيريم والسكران في مقاومه سوسة الأرز أثناء تخزين التقاوي من بعض أصناف القمح (سخا 93، جميزة 10 و جيزة 168). ومعرفة تأثيرها على جودة التقاوي والإصابة الحشرية وذلك عند تخزين التقاوي لفترات مختلفة (0 ، 6 و18 شهرا). أجريت تجربة معملية بمعمل بحوث تكنولوجيا البذور بالمنصورة معهد بحوث المحاصيل الحقلية مركز البحوث الزراعية خلال عامي 2009 و 2011م. ويمكن تلخيص أهم النتائج فيما يلي:

أدى استخدام الجرعة الموصي بها من الملاثيون إلى الحصول على نسبه موت للحشرات الكاملة 100% وعند استخدام (نصف جرعة الملاثيون الموصي بها + مستخلصات النيريم أو السكران) زادت نسبة الموت مقارنه بإستخدام المستخلص أو نصف جرعة من الملاثيون كلاً على حده.

وتشير النتائج أيضا إلى أن زيادة فترات التخزين من بعد المعاملة مباشرة إلى 6 شهور ثم إلى 18 شهر أدى إلى انخفاض تدريجي في نسبة الإنبات وقوة البادرات وزيادة نسبة الإصابة الحشرية والفقد في الوزن الجاف للبذور كذلك أدى إلى زيادة نسبه البروتين وانخفاض نسبه الكربوهيدرات. وكانت بذور الصنف جيزة 168 الأقل في النسبة المئويه للإصابة الحشرية للبذور والفقد في الوزن الجاف للبذور عن بذور الصنفين سخا93و جميزة 10. وكانت الأعلى و الأكثر قدره على الاحتفاظ بحيويتها خلال فترات التخزين المختلفة مقارنه بالصنفين الأخريين.أدت معاملة البذور قبل التخزين بالملاثيون منفرداً أو خلطه مع المستخلصات النباتية أو نصف الجرعة الموصى بها من الملاثيون مع هذه المستخلصات إلى نقص في الإصابة الحشرية و في نسبة الفقد في الوزن الجاف للبذور مقارنة بالبذور غير المعاملة أو المعاملة بالمستخلصات فقط و إلى حماية البذور وبالتالي الحفاظ على حيويتها وجاءت هذه النتائج متقاربة مع النتائج المتحصل عليها من استخدام الجرعة الكاملة من الملاثيون مع نفس هذه المستخلصات.

توصى هذه الدراسة بإمكانية معامله بذور القمح صنف (جيزة 168 ،سخا93 وجميزة 10) قبل التخزين بالملاثيون منفرداً أو خلطه مع المستخلصات النباتية أو نصف الجرعة الموصى بها من الملاثيون مع هذه المستخلصات للوقاية من الإصابة بسوسة الأرز والمحافظة على جوده البذور أثناء التخزين.

قام بتحكيم البحث

أ.د / على السعيد شريف	**كلية الزراعة – جامعة المنصورة**
أ.د / محمود ابراهيم العميرى	**مركز البحوث الزراعية**