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Influence of Seed Dressing by Yeast Extract and Fungicides on Seed Quality of Wheat During Storage

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ABSTRACT

Laboratory experiment was carried out during 2014 to 2015 years to study the effect of dressing wheat seed (c.v. Misr1) with yeast extract, fungicides (Vitavax-200 and Maxim XL) or mixture of fungicide and yeast extract on physiological seed quality after 0, 6, 12,18 months from storage. The results revealed that prolonging storage period was significantly affected, seed viability (germination percentage, germination rate and speed of germination), seedling vigor (seedling length and its dry weight as well as seedling vigor index), seed rot and abnormal seedlings after 18 months as compared with other storage periods. Increasing storage period lead to decreasing field fungi (*Alternaria triticina*, *Bipolaris sorokiniana*, *Fusarium* spp.) and increasing storage fungi (*Aspergillus* spp. and *Penicillium* spp.). Also, the effect of seed treatments by yeast extract or fungicides on all studied characters was significant, where yeast extract treatment was the highest values followed by Maxim XL + yeast extract, Vitavax-200 + yeast extract, Maxim XL and Vitavax-200, respectively and gave the less values of abnormal seedlings and seed rot. Fungicides (Maxim XL and Vitavax-200) or Maxim with yeast extract lead to eliminated all fungi of seed wheat (c.v. Misr1), while yeast extract treatment reduced number of field and storage fungi. Field or storage fungi were negatively and significantly correlated with normal seedlings, speed of germination, seedling length, seedling dry weight and seedling vigor index, while it was positively significantly correlated with abnormal seedlings and seed rot. It could be suggested to use yeast extract (250 ml/kg seed) or yeast extract + fungicides *i.e.* Maxim XL or Vitavax-200 (250 ml + 2g/kg seed) as seed dressing of wheat to improve seed performance, reduce number of fungi field and storage as well as decrease seed deterioration during storage.

Keyword: Wheat- storage - seed borne fungi - yeast - fungicides.

INTRODUCTION

Quality characters of wheat seed (*Triticum aestivum* L.), such as seed germination, moisture content, seed discolouration and seed-borne fungi prevalence have long been known to be influenced by various factors during storage. If infested wheat grains is used as seed, not only would the seed-borne diseases reduce crop yield, but also they still a source of disease inoculums. Niaz and Dawar (2009) found that seed-borne fungi are responsible for both pre- and post-emergence death of seeds, affect seedling vigor and thus some reduction in germination and also variation in plant morphology. Malaker *et al.* (2008) observed 27.1% of *Aspergillus* spp. infection wheat seed reduced the germination to 68% at the end of tenth month of storage, therefore it is necessary to study seed quality changes occur during storage as a result of changes in biochemical constituents of seeds due to fungal infection. The storage fungi are comprising several species of *Aspergillus* and *Penicillium* they do not invade grains to any appreciable degree or extent before harvest, but they can cause severe discoloration of seed in storage resulting in germination failure, discolored or otherwise damaged embryos or whole seeds, and production of mycotoxin that constitute a health hazard for man and animals (Dharam, 1986). Fungicidal seed treatment is useful for the protection of seeds from pathogens during storage. Seed treatment becomes more economical and effective when it is carried out with respect to mature of pathogen and level of infection percentage (Neergaard, 1979). Hooda and Singh (1993) showed that wheat seed treatmented with Vitavax [carboxin] improved seed germination above (85%) up to 15 month of storage. Biological activity (germination energy, percentage of germination and seedling vigor) was significantly higher in the seeds treated with fungicide (Benomyl, Baytan and Vitavax) during storage (Svetov, 1991). Gupta *et al.* (1990) found that seed treatment with Dithane M-45 eliminated all fungi and after 48h storage all seeds germinated after 24 month storage *Aspergillus flavus, A. niger* and *Penicillium* spp. were the main case of reduced germination of untreated seeds with Bavistin, Benlate and Campogran-M, Captan and Mancozeb reduced the incidence of fungal contamination and germination rates compared with the untreated control. Fungicides form a zone of protection over the seed surface that reduces seed decay and seedling blight, resulting in healthy and vigorous seedlings (Marimuthu and Nakeeran, 2001). Yeast extract was effective in reducing deterioration of peanut seed (Aml and Abd El-Hai, 2011) and reduced pre-, post emergence damping of sugar beet (Shalaby and El-Nady, 2008).Yeast extract is a natural source of many growth substances (thiamine, riboflavin, niacin, pyridoxine and vitamins B1, B2,B3 and B12, cytokinins and many of the nutrient elements as well as organic compounds *i.e.* protein, carbohydrates, nucleic acid and lipids (Nagodawithana, 1991). Various fungal flora associated with wheat seeds differed in their prevalence depending on the length of storage period and types of container used for storage. The population of field fungi viz, *Alternaria alternata*, *A. triticina, Bipolaris sorokiniana, Cladosporium cladosporioides, Crvularia lunata, Epiicoccum purpurasccen*s and *Fusarium* spp. decreased while that of storage fungi vis., *Aspergillus*, *Chaetamium, Ngrospora, Penicillium* and *Rhizopus* increased with the progress of storage period (Malaker *et al.* 2008). Barbara (2009) showed that increase of infection by species of *Penicillium* and *Aspergillus* known as storage fungi was detected on seeds after storage, especially after four years, the same time isolation of species of *Fusarium* and *Bipolaris sorokiniana* from these seeds decreased, differences in number of field and storage fungi were found in

dependence on period of storage, also they found that the smallest infection by *B. sorokiniana* and *Fusarium* was observed on seed after five years of storage of spring barley grains. Filed and storage fungi that attack seeds are responsible for major manifestation of deterioration in stored seeds as a decrease in germinability, discoloration, biochemical changes, heating, mustiness total decay and mycotoxin production of spring barley (Agarwal and Sinclair, 1997).

The aim of the this study was to determine the effect of seed dressing with yeast extract (*Saccharomyces cerevisiae*) and fungicides (Vitavax-200 and Maxim XL) on wheat seed quality (viability and health seed) during storage.

MATERIALS AND METHODS

This investigation was carried out at Seed Technology Research Unit Mansoura, Seed Technology Research Department, Field Crops Research Institute, ARC, Egypt during 2014 to 2015 to study the effect of seed dressing as a seed treatment by fungicides or yeast extract on seed, seedling vigor and its health under different storage periods. Wheat seed (c.v. Misr1) were obtained from Central Administration for Seed Testing and Certification during 2014 season, while fungicides Vitavax 200 [Carboxin 37.5%+ Thiram 37.5%] and Maxim XL 3.5% [Fludioxonil 2.5%+ Mefenoxam (Motalaxyl-M) 1%] were obtained from Uniroyal Chemical Company, Egypt and Syngentat-Agro-Egypt, respectively.

Preparation of yeast extract:

Active dry yeast was dissolved in water at the rate of 3 g/l followed by adding sugar at ratio 1:1 and kept overnight for activation and reproduction of yeast and multiplied efficiently during conducive aerobic. These nutrition conditions allowed to produce denovo beneficial bio-constituent (carbohydrates , sugars, proteins, amino acids, fatty acid, hormones, etc.), then these constituents cold release out of yeast cells in readily form by two cycles of freezing and thawing for disruption of yeast cells and releasing their content. This technique for yeast preparation was modified by **Spencer *et al.* (1983).**

Seed treatments:

Samples of wheat seed were used in this experiment were divided into six portions and subjected to the following treatments:-

1-Yeast extract (250ml/kg seed).
2- Maxim XL (2g/ kg seed).
3-Vitavax 200 (2g/kg seed).
4- Maxim XL + yeast extract (2g +250 ml/kg seeds).
5- Vitavax 200 + yeast extract (2g +250 ml/kg seeds).
6- Untreated seed (control).

Wheat seeds were subjected to dressing with suspension yeast extract and fungicides plus 3 ml sterile water. All were mixed properly as seed dressing treatment in 1000 ml dry flasks on a mechanical shaker for about 20 min tell the seeds have adsorbed. The treated seeds were placed in open petri plates (15cm) and heated in forced-air oven circulation for 48h (RETSCH- Germany) at a temperature of 25°c to return to original moisture 12-14%. Seeds were stored in cotton bags (500gm for each treatment) and kept in laboratory conditions. The studied traits were estimated directly, after 0, 6, 12 and 18 months from treatments.

Seed and seedling vigor:

Seeds were sown on Petri-dishes (12cm) contained three layers of moistened blotters, eight replicates of 25 seed / Petri (200seeds) from each treatment were incubated in the growth chamber (Seedburo Equipment Company, USA) for 8 days night lengths 15/9h at 25°c ± 2 and evaluated the following:-

- Germination percentage (GP %) It was calculated by counting only normal seedlings (ISTA, 1999).

$$GP = \frac{N1 - N2}{N1} \times 100$$

Where N1 is total number of treated seed plated, N2 the number of abnormal seedling plus seed rot.

- Germination speed index (GSI): It was calculated as described in the **(AOSA, 1983)** by the following formula.

$$GSI = \frac{\text{No. of germinated seed}}{\text{Days of first count}} + \frac{\text{.....}}{\text{.....}} + \frac{\text{No. of germinated seed}}{\text{Days of first count}}$$

The seeds were considered germinated when the radicle was at least 2 mm. long.

- Germination rate (GR): It was defined according to Bartllett (1937).

At the final count, five normal seedlings from each replicate were randomly taken to measure seedling characters:

- **Seedling length:** It was measured of five normal seedlings 8 days after planting.
- **Dry weight (gm):** Seedlings were dried in hot-air oven at 70 °C for 12 hours to obtain seedling dry weight (g) according to (Krishnasamy and Seshu 1990).
- **Seedling Vigor Index (SVI):** It was calculated according to equation of (Abdul-Baki, 1980).

Seedling Vigor Index=Dry weight (g) x Germination %.

Detection of seed-borne mycoflora was carried out by following the procedures published by (ISTA, 1999). Two hundred seeds from each treatment and storage period were tested by Deep Freezing Method, 25 seeds per plate were placed on a 3-layered well soaked blotter in Petri-dishes (9cm) as described above, each sample had eight replicates. The Petri-dishes were incubated for 24h at 25°C and then freezed to -20°C for 6 to 8h followed by incubated at 25°c for 5 to 7 days (Mathur and Kongsdal, 2003). After the incubation period each Petri-dishes was examined under a stereomicroscope (Wild Heerbrugg 6.3x 32x) in order to record the incidence of different seed-borne fungi. Primary identification of fungi grown on the wheat seeds was performed on the basis of their typical colony characteristics and conidial morphology and recorded percentage of fungi to the following formulae:

$$\text{Fungal (\%)} = \frac{N1}{N2} \times 100$$

Where N1: Is the seeds with fungal growth; N2 the number of treated seeds.

For complementary identification of the fungi up to species level mycelium of fungi growth on the filter papers were isolated on potato dextrose agar (PDA). Cultures were maintained on PDA at 24°C ± 2 for 7 to 10 days and the identification was conducted using morphological characters such as spores size, shape, color and their arrangement on the conidiophores and morphology of the mycelium (Utobo *et al.,* 2011) by referring to Nelson *et al.,* 1983, Sivanesan, 1987; Leslie and Summerell, 2006 and Watanabe, 2002.

Data collected from these experiment was subjected to analysis variance as Completely Randomized Design as mentioned by (Gomez and Gomez, 1984), and the averages were compared by using the least significant differences (LSD) method. Correlations coefficient was computed according to Svap (1973).

RESULTS AND DISCUSSION

Data in Table 1 show that effect of storage periods on studied characters were significantly. Germination percentage (normal seedlings) reduced with increasing storage periods for 0 to 6, 12 and 18 months. The highest mean (88.0) of normal seedlings was obtained at the first storage period, while the lowest mean (80.8) was obtained after 18 months. Also germination rate and germination speed were (0.73) and (81.2) with 0 month storage and it were reduced to (0.66) and (77.2) at 18 months storage, respectively. The same trend was obtained for seedling length (cm), seedling dry weight (g) and seedling vigor index. On contrast, abnormal seedlings and seed rot recorded the lowest values at the first storage period (8.8%) and (3.2%), respectively, while recorded (12.8%) and (6.3%) with 18 months. The reduction in seed viability and seedlings vigor traits might be due to increasing storage periods. Wheat seeds infested with storage or filed fungi might be due to attributed to the production of toxin interferes with protein synthesis by inhibiting the incorporation of amino acids into protein resulting in non-germination of embryo. Similar results with Janardhan *et al.* (2011) reported that toxins affect the plants by inhibition seed germination, elongation of hypocotyl or root of developing seeds. Vigor is essentially a physiological phenomenon influenced by the reserved metabolites, enzyme activities and growth regulators. Vigor index value which is the totality of germination and seedling growth has been regarded as a good index to measure the vigor of seeds (Abdul-Baki and Anderson, 1973). Normally, loss of vigor precedes loss of viability; also pathogen infection severely affects the seedlings vigor during storage.

Table 1. Effect of storage periods and seed treatments on seed viability and seedling vigor of wheat (c.v. Misr1)

Characters / Treatments	Normal seedlings	Abnormal seedlings	Seed rot	Germination speed index	Germination rate	Seedling length	Seedling dry weight	Seedling vigor index
A- Storage periods								
0 month	88.0	8.8	3.2	81.2	0.728	16.1	0.356	31.1
6 months	86.7	9.8	3.5	77.8	0.713	15.5	0.355	31.0
12 months	86.2	9.7	4.2	77.3	0.705	15.2	0347	30.4
18 months	80.8	12.8	6.3	77.2	0.660	14.7	0.342	29.5
F. test	*	*	*	*	*	NS	*	*
LSD at 5 %	1.3	1.1	0.8	0.9	0.01	-	0.01	0.7
B- Seed treatment								
Yeast extract	92.7	5.2	2.0	83.0	0.721	20.9	0.404	37.3
Maxim XL	87.0	9.0	3.5	79.0	0.681	12.4	0.309	27.8
Vetavax-200	83.2	12.0	3.5	76.0	0.680	11.6	0.316	26.4
Max + Yeast	89.7	6.0	4.7	82.5	0.735	16.2	0.390	36.0
Vetavax + Yeast	86.7	9.0	4.2	77.5	0.721	16.4	0.384	33.6
Control	73.0	20.0	7.0	70.7	0.672	14.7	0.298	21.9
F. test	*	*	*	*	*	*	*	*
LSD at 5 %	1.6	1.4	1.0	1.1	0.01	1.5	0.04	0.9

Table 1 also showed that the effect of seed treatments by yeast extract and fungicides (Maxim XL and Vitavax- 200) on all studied characters was significant. Yeast extract had the highest means of normal seedlings (92.7%), germination speed (83.0%), seedling length (20.9cm), seedling dry weight (0.404 g) and seedling vigor index (37.3), followed by Maxim XL + yeast extract, Vitavax 200 + yeast extract, Maxim XL and Vitavax 200 respectively. On the other hand, abnormal seedling and seed rot recorded the less value with yeast extract treatment and the highest value with Vitavax 200 as compared with control. Use fungicide as

seed treatment is the most widely followed management practice in all crops. These results are agreed with those reported by Neergaard (1979), Hooda and Singh (1993), Vasundhara and Gowda (1999) and Marimuthu and Nakeeran, 2001. Systemic fungicides in nature it inhibits the colony growth and sporulation of fungi and eradicates both the external and internally seed-borne pathogens, but found that Vitavax- 200 gave the lowest of normal seedlings percentages and highest of abnormal seedlings as compared with other treatments because Vitavax induces various types of spindle of abnormalities, inhibits cell plant formation and exhibits antimiotic activity at a concentration of 500 mg/l and above (Somashekar and Gowda, 1984). Also, seed treatment with yeast extract improved seed vigor, seedling characters and minimized the seed rot and abnormal seedlings percentages under all storage periods to its content of high auxin, cytokinins, sugars, protein, amino acids and also several vitamins, to side its effect on cell division and enlargement, protein and nucleic acid synthesis and chlorophyll formation (Castelfranco and Beale, 1983). Zaki *et al.* (2007) stated that growth and productivity of wheat were enhanced by application of yeast extract. These results are agreed with those reported by El-Desouky *et al.* (1998); Mahmoued, (2001) and Aml and Abd El-Hai (2011).

Table 2 show that interaction between storage period and seed treatment and its effect on seed and seedling vigor. The interaction effect was significant for all treatments and storage periods, the highest means of normal seedlings, seedling dry weight and the lowest mean of abnormal seedlings directly after treatment with yeast extract, while the highest mean of seedling vigor index was recorded also from treating wheat seed with yeast extract but after treatment with six months.The lowest means of seed and seedling vigor treats were recorded from stored untreated seed for 18 months. The reduction in seed viability and seedling be due to infested with storage pests (insects and fungi) or might be due to, the increase of some organic compounds in respiration process with increasing storage periods, but those treatments due to reduced deterioration of wheat seeds under storage conditions. Similar results were reported (Malaker *et al*., 2008).

Table 2. Means of seed germination and seedling vigor as affected by interaction between storage periods and seed treatments of wheat (c.v. Misr1).

Characters	Storage periods	Treatments					
		Yeast extract	Maxim XL	Vetavax-200	Maxim + Yeast	Vetavax + Yeast	Control
Normal seedlings	0 month	95	90	85	93	88	77
	6 months	93	89	82	92	87	77
	12 months	93	87	86	94	88	73
	18 months	90	82	80	84	84	65
LSD at 5 %				3.2			
Germination rate	0 month	0.75	0.74	0.71	0.76	0.71	0.70
	6 months	0.72	0.72	0.71	0.74	0.71	0.68
	12 months	0.74	0.66	0.70	0.74	0.75	0.66
	18 months	0.70	0.60	0.60	0.70	0.71	0.65
LSD at 5 %				0.02			
Germination speed index	0 month	84	81	84	86	77	75
	6 months	85	77	74	81	77	73
	12 months	83	81	73	81	76	70
	18 months	80	77	73	82	80	65
LSD at 5 %				2.1			
Abnormal seedlings	0 month	3	9	10	6	8	17
	6 months	6	8	13	5	9	18
	12 months	5	10	10	5	7	21
	18 months	7	11	15	8	12	24
LSD at 5 %				2.7			
Seed rot	0 month	2	1	5	1	4	6
	6 months	1	3	5	3	4	5
	12 months	2	3	4	5	5	6
	18 months	3	7	5	8	4	11
LSD at 5 %				1.9			
Seedling length	0 month	22.5	11.5	11.5	17.5	16.5	17.2
	6 months	21.2	12.5	11.0	14.7	16.7	16.7
	12 months	21.0	13.0	12.5	15.7	15.7	13.0
	18 months	18.7	12.5	11.5	17.0	16.7	12.0
LSD at 5 %				2.8			
Seedling dry weight	0 month	0.427	0.330	0.320	0.380	0.360	0.320
	6 months	0.420	0.300	0.320	0.390	0.400	0.300
	12 months	0.390	0.300	0.310	0.390	0.400	0.290
	18 months	0.377	0.305	0.313	0.400	0.377	0.280
LSD at 5 %				0.05			
Seedling vigor index	0 month	38.0	29.7	27.2	35.4	31.7	24.6
	6 months	39.1	26.7	26.2	35.9	34.8	23.1
	12 months	36.2	26.7	26.7	36.7	35.2	21.2
	18 months	36.0	25.6	25.6	36.1	32.8	18.7
LSD at 5 %				1.8			

Two distinct ecological groups of fungi viz., "field fungi" and "storage fungi" were recorded from wheat seeds (Misr 1 cv.) during storage in different storage periods Table 3. The field fungus were: *Alternaria alternata*, *A. triticina, Bipolaris sorokiniana,Cephalosporium gramineum,Cladosporium* sp.*, Epiicoccum* sp.*, Fusarium culmorum, F. graminearum, F. moniliforum, F. semitectum, Rhizoctonia solani* and *Tricothecium roseum.*The storage fungi were : *Aspergillus* spp., Nigrospora sp. and *Penicillium* spp. *Alternaria triticina* as field fungi appeared to be the most predominant (12%) followed by *B. sorokiniana* (3.5%) next genus *Fusarium,* respectively with first storage period and less gradualness to the other storage period. On contrast, the storage fungi *Aspergillus* spp. and *Penicillium* spp. recorded the highest increase (4.8%) and (4.2%) respectively after 18 months storage. In general the results of the present investigation indecated that the prevalence of field fungi decreased and that of storage fungi increased with increase in length of storage periods, also in the Table 3 illustrated that total fungi reduced from (29.3) at 0 month to (20.3) at 18 months storage of wheat seeds. The decrease in total fungi with increasing length of storage period has been reported by many other workers (Malaker, *et al.,* 2008 and Barbara, 2009). Narkiewiez-Jodko *et al.* (2004) found that the decrease of seed infection by *Alternaria alternate*, *B. sorokiniana* and *Fusarium* spp. was observed after storage. At the same time isolation of *Aspergillus* and *Penicillium* species from these seeds increased.

Table 3. Prevalence of fungi associated with wheat seeds (c.v. Misr1) in different storage periods.

Fungi / Storage periods	*Alternaria alternata*	*Alternaria triticina*	*Aspergillus* spp.	*Bipolaris sorokiniana*	*Cephalosporium gramineum*	*Cladosporium* sp.	*Epicocum* sp.	*Fusarium culmorum*	*F. graminearum*	*F. moniliforme*	*F. semitectum*	*Nigrospora* sp.	*Penicillium* spp.	*Rhizoctonia solani*	*Tricothecium roseum*	Total fungi
0 month	3.8	12.0	0.8	3.5	1.0	0.7	0.3	1.5	1.3	1.3	1.3	0.8	0.3	0.7	0.0	29.3
6 months	5.3	8.2	1.2	1.3	0.5	0.3	0.3	0.7	0.5	1.3	0.7	0.0	1.5	0.3	0.2	22.3
12 months	3.6	4.7	2.0	0.8	0.5	0.7	0.3	0.2	1.7	0.7	0.5	0.0	4.3	0.0	0.8	20.8
18 months	3.8	2.2	4.8	0.5	0.0	1.5	0.7	0.2	0.5	0.2	0.0	0.0	4.2	0.0	1.7	20.3
F. test	NS	*	*	*	NS	NS	NS	*	NS	*	*	*	*	*	*	-
LSD at 5 %	-	2.0	1.3	1.2	-	-	-	0.8	-	0.9	0.9	0.6	1.6	0.5	0.4	-

Table 4 showed that the effect of fungicides (Maxim XL and Vitavax- 200) or mix with yeast extract lead to elimination for all fungi of seed wheat (Misr 1 cv.) while yeast extract treatment reduced numbers of field and storage fungi, *Alternaria triticina* recorded (27.5%) as control and reduced to yeast extract to (12.1%), *A. alternate* from (15.7%) to (8.7%), *Penicillium* spp. from (11.5%) to (4.0%), *F. graminearum* from (4.5%) to (1.5), *B. sorokiniana* from (6.5%) to (2.7%) and *F. moniliforum* from (4.0%) to (1.2%) et… . The treatments were high significant for all fungi except Nigrospora sp. . On the other hand, show that fungicides was the highest effect on total fungi followed by (fungicide + yeast extract) and yeast extract where reduction the total fungi from (99) as control to (36.4). Fungicidal seed treatment is useful for the protection of seed from pathogens during storage. The beneficial effects of yeast extract may be due to the antifungal activity of its metabolites (Hassanein *et al.,* 2002) so the application of yeasts as plant pathogens control is recommended where, it was found to produce protein aceous killer toxins lethal to fungal strains (Santos *et al.,*2004). These results are in agreement with Gupta *et al.,* 1990; Svetov, 1991; Hooda and Singh, 1993; and Aml and Abd El- Hai, 2011.

Table 4. Effect of yeast extract and fungicides on frequency of seed-borne fungi of wheat (c.v. Misr1).

Fungi / Seed treatments	*Alternaria alternata*	*Alternaria triticina*	*Aspergillus* spp.	*Bipolaris sorokiniana*	*Cephalosporium gramineum*	*Cladosporium* sp.	*Epicocum* sp.	*Fusarium culmorum*	*F. graminearum*	*F. moniliforme*	*F. semitectum*	*Nigrospora* sp.	*Penicillium* spp.	*Rhizoctonia solani*	*Tricothecium roseum*	Total fungi
Yeast extract	8.7	12.1	3.2	2.7	0.0	0.5	0.0	1.0	1.5	1.2	0.5	0.5	4.0	0.0	0.5	36.4
Maxim XL	0.0	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Vetavax- 200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maxim + Yeast	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vetavax + Yeast	0.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Control	15.7	27.5	9.2	6.5	3.0	4.2	2.5	2.7	4.5	4.0	3.2	0.7	11.5	1.5	3.0	99
F Test	*	*	*	*	*	*	*	*	*	*	*	NS	*	*	*	-
LSD at 5 %	2.1	2.5	1.6	1.5	0.9	0.9	1.0	1.0	1.4	1.2	1.1	0.8	2.0	0.6	1.1	-

Table (5) showed that correlation coefficient for seed and seedling vigor with filed and storage fungi. There were negatively significant correlation for the relationship between *Alternaria triticina* (r = -0.327) with control seedlings, germination speed (r =- o.211), positive and significant for abnormal seedlings(r = o.383) and seedling length (cm) (r = 0.303). *Bipolaris sorokiniana* was negatively significant correlated with

normal seedlings (r = -0.248) and seedlings vigor index (r = -0.206), while there was positively significant correlated with abnormal seedlings (r = 0.294), seed rot (r = 0.063), seedlings length (r = 0.259). *Cephalosporium gramineum* were negatively significantly correlations for normal seedlings (r = -0.275), speed germination (r = -0.254), seedling dry weight (gm) r = -0.266) and seedling vigor index (r = -0.317), while was positively significant correlated with abnormal seedlings (r =0.316). *Fusarium graminearum* was negatively significant correlated with normal seedlings (r = -0.342), germination speed (r = -0.327), seedling dry weight (gm) (r = -0.210) and seedlings vigor index (r = -0.320), while was positively correlated with abnormal seedlings (r = 0.363). *Fusarium moniliforum* was negatively germination correlated with normal seedlings (r = -0.302), germination speed (r =-0.240) and seedlings vigor index (r = -0.284), while recorded positively germination correlated with abnormal seedlings (r = 0.347). On contrast, storage fungi *Aspergillus* spp. was negatively significant correlated with normal seedlings (r = -0.591), germination speed (r = -0.558), seedling dry weight (r = -0.328) and seedlings vigor index (r = -0.449), positively with abnormal seedlings (r = 0.573) and seed rot (r = 0.439), also *Penicillium* spp. recorded negatively significant correlated with normal seedlings (r = -0.566), germination speed (r = -0.538), seedlings dry weight (r = -0.349) and seedlings vigor index (r = -0.445), positively with abnormal seedlings (r = 0.570) and seed rot (r = 0.385). Generally found that filed or storage fungi were negatively significant correlated with normal seedlings, germination speed, seedling length , seedlings dry weight and seedling vigor index, while were positively significant correlated with abnormal seedlings and seed rot. Pathogenic fungi were represented by *B. sorokiniana* and *Fusarium* spp. the most dangerous pathogens because can cause seedling diseases and damage of root and stem bas of older plants, also can limit germination drastically or infected grain gives rise to diseased and weak seedlings. Saprophytic fungus may be potenti all dangerous for plant, because it can produce a toxi- tenausonic acid, which inhibits roots and sprout elongation and alternariol, delaying seedling development (Baturo, 2002). Similar results were reported by (Niaz &Dawar, 2009).

Table 5. Correlation coefficient of seed and seedling vigor with seed-borne fungi of wheat (c.v. Misr1).

Characters / Fungi	Normal seedling	Abnormal seedling	Seed rot	Germination speed index	Seedlings length (cm)	Seedlings dry weight (g)	Seedlings vigor index
Alternaria alternata	-0.414*	0.465*	0.181 **NS**	-0.320*	0.239*	-0.150 **NS**	-0.290*
Alternaria triticina	-0.327*	0.383*	0.103 NS	-0.211*	0.303*	-0.100 NS	-0.260*
Aspergillus spp.	-0.591*	0.573*	0.439*	-0.558*	-0.060 NS	-0.328*	-0449*
Bipolaris sorokiniana	-0.248*	0.294*	0.063 NS	-0.184 NS	0.259*	-0.105 NS	-0.206*
Cephalosporium gramineum	-0.275*	0.316*	0.104 NS	-0.254*	0.014 NS	-0.266*	-0.317*
Cladosporium sp.	-0.608*	0.627*	0.376*	-0.512*	-0.027 NS	-0.317*	-0.463*
Epicocum sp.	-0480*	0.467*	0.348*	-0.482*	-0.166 NS	-0321*	-0.413*
Fusarium culmorum	-0.148 NS	0.221*	0.047 NS	-0.143 NS	0.180 NS	-0.049 NS	-0.162 NS
Fusarium graminearum	-0.342*	0.363*	0.175 NS	-0.337*	0.051 NS	-0.210*	-0.320*
Fusarium moniliforme	-0.302*	0.347*	0.107 NS	-0.240*	0.174 NS	-0.163 NS	-0.284*
Fusarium semitectum	-0.320*	0.351*	0.156 NS	-0.196 NS	0.117 NS	-0.155 NS	-0.292*
Nigrospora sp.	-0.015 NS	0.041 NS	0.046 NS	0.009 NS	0.149 NS	0.058 NS	-0.027 NS
Penicillium spp.	-0.566*	0.570*	0.385*	-0.538*	-0.076 NS	-0.349*	-0.445*
Rhizoctonia solani	-0.237*	0.278*	0.075 NS	-0.133 NS	0.116 NS	-0.171 NS	-0.236*
Tricothecium roseum	-0.584*	0.553*	0.490*	-0517*	0.138 NS	-0.294*	0.490*

REFECRENCES

Abdul-Baki, A. A. and J. D. Anderson(1973).Vigour determination of soybean seeds by multiple criteria. Crop Sci., 13: 630-633.

Abdul-Baki, A.A. (1980). Biochemical aspects of seed vigour. Hort. Sci., 15: 765-771.

Agarwal, V.K. and J.B. Sinclair (1997). Principles of seed pathology. Second edition CRC Press Inc., Lewis.

Aml, E.A. El-Saidy and K.M. Abd-Hai (2011). Alleviation of peanut seed deterioration during storage using Biotic and Abiotic agents. Res. J. of Seed Sci.,4(2):69-81

Association of Officinal Seed Analysis A.O.S.A. (1983). Seed Vigor Testing Handbook. Contribution No.32 to the Handbook on Seed Testing.

Barbara, W. (2009). Long-time storage effect on the seed health of spring barley grains. Plant Breeding and Seed Sci., 59: 3–12.

Bartllett, M.S. (1937). Some samples of statistical method of research in agriculture and applied biology. J. of the Royal Stat. Soc. 4:2.

Baturo, A. (2002).Head healthiness and fungus composition of spring barley harvested grain cultivated under organic, integrated and conventional farming system. Phytopathologia Polonica, 26: 73-83.

Castelfranco, P.A. and S.I. Beale (1983). Chlorophyll biosynthesis. Recent advances and area of current interest. Ann. Rev. of Plant Physiol., 34:241-278.

Dharam Vir. (1986). Storage diseases of wheat. *In:* Problems and Progress of Wheat Pathology in South Asia. L.M. Joshi, D.V. Singhand K.D. Srivastava (eds.). Malhotra Publishing House, New Delhi. pp: 296-304.

El-Desouky, S.A.; A.L.Wans and Z.M. Khedr (1998). Utlization of some natural plant extracts (of garlic and yeast) as seed soaked materials to squash (*Cucurbatia pepo* L.).1- Effect on growth, sex expression and fruit yield and quality. J. Agric. Sci. Moshtohor, Zagazig. Univ., 35(2):839-854.

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

Gupta, R.B.L.;V.L. Majumdar and G.C. Bhatnagar (1990). Influence of seed dressing fungicides on mycoflora and viability of wheat seed under storage. Seed Res., 18: 157-159.

Hassanein, N.M.; A.A.El-Mehalawy; H.M.Khater; A.K.El-Zahraa and A.Y.Youssef (2002).The potential of selected Rhizosphere actinomycetes and yeast fungi for the biological control of late wilt disease of maize caused by *Cephalosporium maydis*. African. J. Mycol. Biotech, 1: 167-188.

Hooda, K. S. and M. Singh (1993). Storage of vitavax treated wheat seeds in relation to seed moisture and control of loose smut in field. Seed Res., 21(2): 123-125.

ISTA Rules (1999). Handbook of Vigour Test Methods 3rd Edn..International Seed Testing Association, Zurich, Association,pp:22-25.

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

Krishnasamy, V. and D.V. Seshu (1990). Phosphine fumigation influence on rice seed gremination and vigor. Crop Sci., 30: 82-85.

Leslie, J.F and B.A. Summerell (2006). The Fusarium Laboratory Manual. Blackwell Publishing, Ames, IA, USA. p. 388.

Mahmoud, T.R. (2001). Botanical studies on the growth and germination of magnolia (*Magnolia grandiflora* L.) plants. M. Sci .Thesis. Fac. of Agric. Moshtohor, Zagazig Univ., Egypt.

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

Marimuthu, T. and S. Nakeeran (2001). Seed-The Vector and Victim of Diseases. In: Recent Techniques and Participatory Approaches on Quality Seed Production, Natarajan, N., K. Vanangamudi and A. Bharathi (Eds.). Kalyani Publishers/Lyall Book Depot, India, pp: 415-426.

Mathur, S.B. and O. Kongsdal (2003). Common Laboratory Seed health testing method for detecting fungi. Intern. Seed Testing Assoc., Bassersdorf, Switzerland, p. 427.

Nagodawithana,W.T. (1991). Yeast Technology. Universal foods corporation Milwaukee, Wisconsin. Van Nostrand Reinhold.New York, p.273.

Narkiewiez-Jodko,M.; Z.Gil; M.Liszewski (2004). Wplyw warunkow przechowywania na zdrowotnosc I cechy towaroznaweze ziarna jecz mienia jarego, Pam.Pul. Z.135:189-198.

Neergaard, P. (1979). Seed Pathology. Vol 1., The Macmillan Press Ltd., London, UK.

Nelson, P.E.; T.A. Toussoun and W.F.O. Marasas (1983). Fusarium species: An illustrated manual for identification. The Pennsylvania State University Press, University Park. USA. p. 193.

Niaz, I. and S. Dawar (2009). Detection of seed borne mycoflora in maize (*Zea mays* L.). Pakistan. J. Bot., 41(1): 443-451.

Santos, A.; A. Sanchez and D. Marquina (2004).Yeasts as biological agents to control *Botrytis cinerea*. Microbiol.Res.,159:331-338.

Shalaby, M.E. and M.F. El-Nady(2008). Application of *Saccharomyces cerevisiae* as a biocontrol agent against *Fusarium* infection of sugar beat plants. Acta Biologica Szegediensts , 52(2): 271-275

Sivanesan, A. (1987). Graminicolous species of Bipolaris, Curvularia, Drechslera, and Exserohilum and their Telemorphs, CAB International Mycological Institute, Kew, surrey, England, p. 261.

Somashekar, R.K.and T.G. Gowda (1984). Effect of a fungicide Vitavax on (*Allium cepa* L.) Cutologia, 49:177-181.

Spencer, J. F. T.; S.M. Dorothy and A. R. W. Smith.(1983). Yeast genetics: fundamental and applied aspects. New York: Springer-Verlag. New York, U.S.A.

Svap, J. (1973). Biometriai modserek a Kutatsban-Mezogazdasagi, Kiado, Budapest, (in Hungurian).

Svetov,V.G. (1991). Combined treatment of wheat seeds. Khimizatsiya Sels, skogo Khozyaistva, 8: 86-88.

Utobo, E.B.; E.N. Ogbodo and A.C. Nwogbaga (2011). Seed-borne mycoflora associated with rice and their influence on growth at Abakaliki, Southeast Agro-Ecology, Nigeria. Lib.Agric. Res. Cen. J. Int., 2 (2): 79-84.

Vasundhara, S. and B.A. Gowda (1999). Effect of fungicidal seed treatment on seed quality of groundnut seeds in storage. Seed Res., 27: 223-224.

Watanabe, T. (2002). Pictorial Atlas of Soil and Seed Fungi: Morphologies of Cultured Fungi and Key to Species. CRC Press LLC., pp: 506.

Zaki, N.M.; M.S Hassanein and K.M Gamal El-Din(2007). Growth and yield of some wheat cultivars irrigated with saline water in newly cultivated land as affected by biofertilization. J. Appl. Sci. Res., 3 (10): 1121–1126.

تأثير المعاملة بمستخلص الخميرة والمبيدات الفطريه على جودة تقاوي القمح أثناء التخزين

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أجريت تجربه معمليه خلال عامي 2014 وحتى 2015 بهدف دراسة تأثير معاملة تقاوي القمح صنف مصر 1 (seed dressing) بمستخلص الخميرة بتركيز 3جم/لترو المبيدات الفطرية (فيتافاكس200 و ماكسيم بمعدل 2جم/كجم تقاوي لكليهما و مستخلص الخميرة + فيتافاكس، مستخلص الخميرة + ماكسيم) على جودة تقاوي القمح خلال فترة التخزين .أوضحت النتائج أن زيادة فترة التخزين حتى 18 شهر أدت إلى انخفاض حيوية التقاوي (النسبة المئوية للانبات – معدل الإنبات – سرعة الإنبات) و قوة البادرات (طول البادرات - الوزن الجاف للبادرات ودليل قوة البادرات) وزيادة نسبة عفن البذور والبادرات غير الطبيعية . أدت المعاملة بمستخلص الخميرة الحصول على أعلى القيم للصفات المدروسه يليها مستخلص الخميرة + ماكسيم و مستخلص الخميرة + فيتافاكس ثم ماكسيم منفردا و أيضا فيتافاكس منفردا على الترتيب وذلك مقارنة بمعاملة الكنترول .- أدت زيادة فترة التخزين الى انخفاض أعداد فطريات الحقل *Fusarium* spp. , *A. triticina* , *Alternaria alternata* على البذور وزيادة فطريات المخزن مثل *Bipolaris sorokiniana*, *Aspergillus* spp. , *Penicillium* spp. وكانت فطريات *Alternaria triticina* أكثر انتشارا على البذور يليها فطر *Bipolaris sorokiniana* ثم *Fusarium* spp. .- أدت معاملة البذور بالمبيدات الفطرية إلى إقصاء تام للفطريات ، بينما أدت المعاملة بمستخلص الخميرة إلى تقليل الأعداد الكلية للفطريات من 99 ككنترول إلى 36.4.- ارتبطت الفطريات ارتباطا معنويا وسالبا مع كل من البادرات الطبيعية وسرعة الانبات وطول البادرات والوزن الجاف للبادرات ودليل قوة البادرات بينما ارتبطت تلك الفطريات ارتباط معنوي موجب مع صفات عفن البذور و البادرات الغير طبيعية.- توصى الدراسة معاملة تقاوي القمح (seed dressing) بمستخلص الخميرة منفردا بمعدل 3جم/لتر(250 مل من المستخلص/كجم تقاوي) أو مستخلص الخميرة مع احد المبيدات الفطرية ماكسيم او فيتافاكس 2جم/كجم تقاوي للمحافظة على حيوية التقاوي وزيادة قوة البادرات وتقليل أعداد الفطريات المحمولة على البذور تحت ظروف التخزين.