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PHYSIOLOGICAL EFFECTS OF YEAST AND EFFECTIVE MICROORGANISMS (EM_1) APPLICATION ON ZAGHLOUL DATE PALM

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Abstract: This study was carried out on Zaghloul date palms grown at fruit Orchard of Faculty of agriculture, Assiut University during 2003 and 2004 season. In order to improve physical and chemical characters of fruits through soil drench applications of active dry yeast (10, 20 or 30 g/palm) and effective microorganisms solution (EM_1, 0.5, 1.0 or 1.5 cm^3/1L/palm) at Hababouk stage of fruit (four weeks after pollination). Twenty one palms were chosed and pollinated with a known male palm throughout the two seasons, where 3 replicates, one palm each, using complete randomized block design (CRB). The selected palms were treated with the abovementioned treatments for determining bunch weight, fruit retention %, physical and chemical characteristics of fruits in response to yeast and EM_1 applications. The obtained results of this study could be summarized as follow. All treatments with yeast or EM_1 improved bunch weight, physical and chemical characteristics of dates. The middle rate of both yeast (20 g/palm) or EM_1 (1.0 cm^3/1L/palm) gave the best results of bunch weight with the best fruit quality of Zaghloul date palms.

On going back to the previously results, it could be concluded that either active dry yeast at 20 g or EM_1 (1.0 cm^3/L)/palm soil drench application four weeks after pollination for obtaining high yield with good fruit quality under the conditions of this study.

Key words: Zaghloul date palm, yeast, effective microorganisms (EM_1), bunch weight, fruit retention, fruit quality.

Introduction

In Egypt, date palms (*Phoenix dactylifera* L.) are distributed in wide range of soils in North, or Middle as well as in Upper Egypt. Date palms could grow under unfavorable conditions where many of other fruit crops could not grow. Zaghloul is one of the best soft date palm cvs. Therefore, many efforts were done by who has an interest for date palm growers to improve yield and fruit quality. One side of these efforts, utilizing biofertilizers in date palm Orchards.

One of these efforts, application of biofertilziers, thereby they increased yield, bunch weight of Zaghloul date palms as compared with untreated ones. Fruit and flesh

weight, dimension and sugar contents were improved (Osman, 2003). Foliar application of Algae extract or yeast each at 0.025 to 0.4% considerably increased the bunch weight and yield of Zaghloul date palm as well as improved the fruit quality compared to unspraying. Spraying algae extract was superior than yeast and the promotion effects was associated with increasing concentrations. Using concentration above 0.1% had a slight effects on yield and dates quality (Gobara, 2004). Zaghloul date palms were biofertilized with Azetobacterine, Asospirillum, Nitrobene, Biogen and Microbene each at 0.0, 100, 200, 400 and 600 g/palm a long with 1000, 900, 800, 600 or 400 g in mineral form, respectively. Supplying the palms with any of these biofertilizers was beneficial in improving yield and bunch weight. Fruit weight, pulp/seed ratio, total soluble solids, sugar contents and crude proteins in the pulp were improving. On the other hand, total acidity %, soluble tannins % and total fibers % were unaffected compared to unbiofertilization.The striking effect was observed on palms received Azetobacterine, Nitrobene, Biogen, Microbene and Azospirillum in descending order. The promotion was associated with increasing the level of biofertilizers from 100 to 600 g/palm (Gobara and Ahmed, 2004).

Spraying active dry yeast on Williams banana caused a remarkable improvement on yield and bunch weight as well as physical and chemical characteristics of the fruits compared to the non-sprayed plants, as pointed out by El-Shammaa (2001), Ahmed *et al*. (2003), Mostafa (2004) and Mostafa and Abou-Raya (2004) on Grand Nain banana.

Also yeast applications were very effective in enhancing yield of Fagrikalan and Alphonse mango cvs, as well as physical and chemical characteristics of the fruits (Abd El-Moniem *et al*., 2003).

Moreover, spraying active dry yeast on Balady Mandarin trees resulted in significant increase of yield, number of fruits/tree, fruit weight, percentages of juice, total soluble solids, total sugars and total soluble solids/acidity, while peel weight and total acidity were decreased (Ebrahiem *et al*., 2000).

Regarding to effective microorganisms (EM_1) effects on some fruit trees, at firstly, EM_1 should be defined. EM_1 is a mixed culture of beneficial microorganisms (primarily photosynthetic and lactic acid bacteria, yeast, actinomycetes and fermenting fungi.

The following topics are some of beneficial influence of EM_1:

1- Promotes germination, flowering, fruiting and ripening in plants.

2- Improves physical, chemical and biological environments of the soil and suppresses soil borne pathogens and pests.

3- Enhances photosynthetic capacity of crops.

4- Ensures better and plant establishment.

5- Increases the efficacy of organic matter as fertilizers (Higa and Wididana, 1991a,b; and Higa, 1994).

To study the effect of EM on orange trees, it was found that yield of orange increased when the soil was treated with 1/500-1/1000 EM solution. Higher sugar content of 1-2° was observed in orange juice (Jao and lee, 2000).

Field investigations were conducted with EM on oranges trees, EM cultures applied to the soil (EMS), to plants (EMP) and to both plants and soils (EMPS) were compared with untreated control (C). Under natural soil conditions (no fertilizer and no pesticide). Results indicated highly significant increases in yield, improved fruit quality and these were correlated with improved soil physical and chemical conditions (Paschoal, 2000).

Therefore, the objective of this study was a trail to examine the influence of soil drench applications of active dry yeast and effective microorganisms (EM_1) solution on bunch weight and fruit quality of Zaghloul date palms grown under Assiut climatic conditions.

Materials and Methods

This study was carried out during two successive seasons 2003 and 2004 at Department of Horticulture Orchard, Faculty of Agriculture, Assiut University. Twenty-one approximately uniform, healthy date palms of Zaghloul cv. 20 years old were selected for this investigation to examine the physiological effects of three concentrations of both, yeast (10, 20 & 30 g/palm) and EM_1 solution (0.5, 1.0 & 1.5 cm^3/L palm) in addition, untreated trees as control. EM_1 solution could be prepared by using EM diluted solution 0.1%, whereas it consists of 1 cc EM_1, 1 g sugar or 1 cc Molasses and 1 liter of water. This solution should left for 2-24 hours and applied to plants (foliar or to soil). Original EM_1 is dormant, yellow-brown liquid with pleasant odor and sweet-sour. Thus means seven treatments were carried out through this investigation, three replicates/treatment, one date palm each, nine spathe were retained/palm by removing excess earliest, latest and smallest ones to maintain approximately (8 leaves/bunch). All shosen palms were pollinated throughout the two seasons by a known male palm with high viable pollen grains. Both yeast or EM_1 was applied during Hababouk stage (four weeks of pollination). This experiment was assigned in a

complete randomized block design (CRB) with three replicates, one palm each, according to Mead *et al*., (1993).

All bunches/palm were harvested at full colour of dates (Khelal stage) during the 3rd week of September in the two seasons. Bunch weight (kg) was determined as average of the nine bunches/palm. Fruit retention % was recorded, where 10 strands/bunch were randomly selected. Number of retained fruits on the strands, as well as total number of flower scars were counted, thereafter ultimate fruit retention % was determined according to the following equation:

$$Fruit\ retention\ \% = \frac{No.\ of\ \ fruit\ retention}{Fruit\ \ retention\ \ No. + Flower\ \ scars\ No.} x\ 100$$

From each bunch, samples of 20 dates replicate were taken at random for determination of some physical and chemical fruit properties.

The standard physical fruit traits included, weight and volume of fruit, weight and percentage of seed, flesh weight and fruit dimensions. These traits were determined by conventional methods whereas, the chemical constituents included.

- Percentage of total soluble solids (TSS%) in dates extract was estimated using a hand refractometer.

- Percentages of reducing and total sugars content were determined in fruit extracts according to Lane and Eynon method outlined in Association of Official Agricultural Chemists (A.O.A.C., 1985), then non-reducing sugars % were calculated.

Results and Discussion

Data obtained of this study concerning effects of yeast and effective microorganisms (EM_1) were explained and discussed trough the following main topics e.g. bunch weight, fruit retention %, as well as physical and chemical characteristics of Zaghloul date palm fruits as follows:

1) Bunch weight:

As shown in Table (1), it is obviously clear that all yeast rates as well as all EM_1 concentrations applied as soil drench to Zaghloul date palms resulted in significant increase in bunch weight (kg) in comparison with untreated (control) date palms in 2003 and 2004 seasons.

Concerning the effect of yeast rates, data indicated that with increasing rates used of the yeast, significantly increased bunch weight. As well as, EM_1 showed the same trend of yeast effects on bunch

weight during the two studied seasons.

In comparing yeast with EM_1, it could be noticed that EM_1 was superior to yeast treatments. Furthermore, generalized it could be observed that the highest concentration of both yeast or EM_1 gave the heaviest bunch weight in comparison with untreated (control) date palms.

These obtained results are in harmony with those found by Gobara (2004) who mentioned that spraying the yeast at 0.025 to 0.4% was effective in increasing the bunch weight and yield of Zaghloul date palm. In addition, Osman (2003) and Gobara and Ahmed (2004) emphasized the important role of biofertilizers in increase Zaghloul date yield and bunch weight. The similar reported by El-Shammaa (2001), Ahmed *et al*. (2003); Mostafa (2004) and Mostafa and Abou-Raya (2004) on Grand Nain banana, where they reported that spraying active dry yeast caused a remarkable promotion on yield, and bunch weight compared to the non-sprayed plants. As well as Paschoal (2000) who deduced that EM culture applied to soil (EMS), to orange trees (EMP) and to both trees and soils (EMPS) induced highly significant increases in yield and these were correlated with improving physical and chemical conditions of soil (Higa, 1994 and Joa and Lee, 2000).

2) Fruit retention percentage:

Data presented in Table (1) illustrated significant differences in fruit retention % of Zaghloul date palm as affected by yeast (10, 20 or 30 g/date palm) and EM_1 (0.5, 1.0 or 1.5 ml/1L) in 2003 and 2004 seasons.

Regarding the effect of yeast on fruit retention %, it was clearly observed that all rates used of yeast induced significant increase in fruit retention % except the highest rate used of yeast (30 g/palm) resulted in a significant decrease in this parameter during 2003 and 2004 seasons.

Concerning the response of fruit retention % to different concentrations applied of EM_1, it was found that treatments with EM_1 caused significant reduction in fruit retention % during the two studied seasons in comparison with untreated (control) palms.

In comparison between yeast and EM_1 as affected fruit retention %, it was obviously that yeast showed positive effective on fruit retention % specially the lower and middle rates used of yeast, while the highest rate of yeast as well as all concentration used of EM_1 induced significant reduction in fruit retention % under the condition of this study.

These positive effects of yeast on fruit retention % could be due to the higher levels of CKs and other

promotive factors of yeast resulted in decreasing fruit drop, meanwhile induced on increase in fruit retention %.

These obtained results are in harmony with those reported by Ebrahiem *et al*. (2000) who found that spraying active dry yeast on Balady mandarin trees resulted in significant increase of number o fruits/tree. Moreover, Higa and Wididana (1991a,b) pointed out that EM using in agriculture promotes flowering and fruiting of plants.

3) Weight and volume of fruit:

Data recorded in Table (1) illustrated significant differences in both weight and volume of fruit in response to both yeast rates and EM_1 concentrations used during the two seasons of this study.

All rates of yeast as well as all concentrations of EM_1 exhibited significant increase in fruit weight in comparison with untreated control palms in 2003 and 2004 seasons. Concerning yeast rates effects on fruit weight, it was clear that fruit weight decreased with increasing yeast rates during the 1st season whereas the lowest rate gave the heaviest fruit weight. On the other hand, fruit weight increased with increasing yeast rates in the 2nd season of the study. Whereas the highest rate produced the heaviest weight of fruits, all data in comparison with untreated control palms and another rates used of yeast.

Regarding the effects of EM_1 concentrations of fruit weight, it could be deduced that the middle concentration used of EM_1 (1.0 cm^3/1L) induced the heaviest fruit weight in comparison with other concentrations of EM_1 and with untreated control palms. These findings of yeast or EM_1 effects on fruit weight could be attributed with the positive or negative effects of the treatments with both yeast or EM_1 on fruit retention % of Zaghloul date palms. Also, yeast might be play a role in the synthesis of protein and nucleic acids which enhance cell division and enlargement leading to weight and volume of fruit increases.

Regarding to fruit volume in response to yeast or EM_1 applications data indicated that treatments with both of yeast and EM_1 resulted in significant increase in fruit volume in comparison with untreated control palms in 2003 and 2004 seasons (Table 1). Furthermore, fruit volume took the same trend of fruit weight in response to both of yeast or EM_1 applications during the two studied seasons, except the lowest rate of yeast gave the biggest level of fruit volume (cc) after the highest rate of yeast on contrary to the middle rate of yeast on fruit weight in the 2nd season, all compared to untreated (control) palms.

These obtained findings of this study are on line with those results found by Gobara (2004) on Zaghloul date and Ebrahiem *et al*. (2000) on Balady mandarin, where they reported that yeast applications either as foliar or soil drench resulted in significant increases in fruit weight or fruit volume in compared with untreated (control) trees. As well as, Paschoal (2000) and Joa and Lee (2000) working on EM effects on orange trees found that treatments with EM improved fruit physical characteristics.

Table(1): Effect of yeast and effective microorganisms (EM_1) applications on bunch weight, fruit retention %, fruit weight and fruit volume of Zaghloul date palm in 2003 and 2004 seasons.

Treatments	Season 2003				Season 2004			
	Bunch weight (kg)	Fruit retention (%)	Fruit weight (g)	Fruit volume (cc)	Bunch weight (kg)	Fruit retention (%)	Fruit weight (g)	Fruit volume (cc)
Control	15.00	29.88	16.88	17.22	16.42	41.21	15.63	16.67
Yeast (10 g/palm)	18.50	31.85	20.58	21.60	19.75	41.67	18.04	19.83
Yeast (20 g/palm)	19.17	35.26	18.79	19.67	20.67	50.86	18.80	19.33
Yeast (30 g/palm)	19.33	29.19	17.74	18.36	20.33	28.32	19.23	21.50
EM_1 (0.5 cm^3/1L)	19.83	26.80	18.99	19.33	19.58	27.39	17.97	20.02
EM_1 (1.0 cm^3/1L)	21.50	24.74	19.59	20.17	20.17	27.83	19.03	20.83
EM_1 (1.5 cm^3/1L)	21.58	28.38	16.94	17.83	20.17	29.87	16.83	18.67
L.S.D. 0.05	1.54	2.16	0.44	0.93	0.99	1.27	0.58	1.07

4) Length and diameter of fruit:

As shown in Table (2) it was obviously that all treatments with yeast or EM_1 induced significant increase in both length (cm) and diameter of Zaghloul dates in 2003 and 2004 seasons.

Concerning the effects of yeast rates on fruit length (cm), it was observed that increasing the rates applied of yeast resulted in significant decrease in fruit length, where the lowest rate used of yeast gave the highest value of fruit length, followed by the 2nd rate of yeast, than the highest rate of yeast gave the lowest value of fruit length in the 1st season, while the 2nd rate of yeast induced the highest value of fruit length, followed by the 1st rate, then the 3rd rate of yeast gave the lowest value of fruit length during the 2nd season, all data were compared with untreated (control) ones.

Regarding the effect of EM_1 concentrations on fruit length, the 2nd rate of EM_1 gave the highest value of fruit length followed by the 3rd rate of EM_1, thereafter the 1st rate of EM_1 produced the lowest value of fruit length in the 1st season, while fruit length decreased gradually with increasing concentrations of EM_1 in the 2nd season.

In comparison yeast with EM_1 effects on this connection generally, it could be noticed that yeast applications were more effective in increasing fruit length than EM_1.

Concerning effect of yeast or EM_1 on fruit diameter it could be observed that all rates used of yeast or EM_1 induced a significant increases in fruit diameter (cm) of Zaghloul date palms in comparison with untreated (control) palms in 2003 and 2004 seasons (Table 2).

Regarding effects of yeast rates on fruit diameter, it was worthy observed that increasing rates of yeast resulted in inducing a reduction in fruit diameter in the 1st season. This effects were true in the 2nd season, with the exception of the 2nd rate of yeast gave the higher value of fruit diameter than the 1st rate of yeast.

Concerning EM_1 effects on fruit diameter, it was obvious that 1st and 2nd rates of EM_1 gave higher values of fruit diameter than the 3rd rate of EM_1 in the 1st season. On the other hand, EM_1 rate effects in the 2nd season showed the same trend of yeast effects on fruit diameter during the 1st seasons. Thus means that fruit diameter decreased with increasing EM_1 rate in the 2nd seasons.

The obtained results of this study are on line with early results reported by Gobara (2004) on date as well as, Ahmed *et al*. (2003), Mostafa (2004), Mostafa and Abou Raya (2004) on some banana cvs. where they showed that yeast application improved length and diameter of fruits.

5) Flesh weight of fruit:

As shown in Table (2) data indicated that all treatments with yeast or EM_1 resulted in a significant increase in flesh weight (g) per fruit of Zaghloul date palm in comparison with untreated control palms in 2003 and 2004 seasons.

Concerning the effects of different rates applied of yeast on flesh weight (g)/fruit, it was clear that all rates of yeast significantly increased flesh weight/fruit. Moreover, the lowest rate of yeast (10 g/palm) was more effective in improving flesh weight than other rates of yeast, and increasing yeast rate decreased flesh weight/fruit during the 1st season of this study. While in the 2nd season the middle rate of yeast gave the heaviest flesh weight (g)/fruit followed by the higher rate, then the lowest rate of

yeast, all data were compared with untreated (control) ones.

Regarding the differences of flesh weight/fruit in response to EM_1 rates, it was worthy observed that the 2nd rate (1.0 cm^3/1L) gave the heaviest weight of flesh/fruit, followed by the 1st rate (0.5 cm^3/1L), then the 3rd rate (1.5 cm^3/1L) all results were in comparison with untreated (control) dates in 2003 and 2004 seasons.

Furthermore, comparing yeast with EM_1 effects on flesh weight/fruit of Zaghloul date palm, it was obvious that all rates of yeast were superior in improving flesh weight/fruit rather than those of EM_1 effects on this parameter.

These obtained findings of this study are in harmony with those results pointed out by Gobara (2004) on Zaghloul date, Ebrahiem *et al*. (2000) on Balady mandarin, Mostafa and Abou-Raya (2003) on Grand Nain banana, where they deduced that yeast improved fruit flesh (pulp) in comparison with untreated (control) ones.

Table (2): Effect of yeast and effective microorganisms (EM_1) applications on some physical characteristics of Zaghloul date palm in 2003 and 2004 seasons.

Treatments	Season 2003				Season 2004			
	Fruit length (cm)	Fruit diameter (cm)	Flesh weight (g)	Seed weight (%)	Fruit length (cm)	Fruit diameter (cm)	Flesh weight (g)	Seed weight (%)
Control	4.92	2.44	15.11	10.97	4.87	2.20	13.75	12.03
Yeast (10 g/palm)	5.62	2.76	18.62	9.68	5.60	2.73	16.33	9.47
Yeast (20 g/palm)	5.05	2.56	17.89	10.47	5.63	2.82	17.67	8.12
Yeast (30 g/palm)	4.96	2.52	15.45	10.49	5.03	2.27	17.57	8.59
EM_1 (0.5 cm^3/1L)	4.97	2.68	17.00	10.49	5.47	2.83	16.53	8.05
EM_1 (1.0 cm^3/1L)	5.32	2.68	17.66	9.46	5.30	2.70	17.63	7.22
EM_1 (1.5 cm^3/1L)	5.00	2.51	15.36	10.47	5.20	2.37	15.97	11.07
L.S.D. 0.05	0.26	0.14	0.41	0.41	0.28	0.27	0.500	0.80

6) Seed weight percentage:

Data presented in Table (2) showed that all rates of both yeast or EM_1 induced significant decrease in seed weight % per fruit of Zaghloul date palm in comparison with untreated control of palms in 2003 and 2004 seasons.

Regarding the changes of seed weight % in response to yeast rates

application, it was noticed that the 1st rate (10 g/palm) gave the best results, followed by the 2nd rate (20 g/palm), then the 3rd rate (30 g/palm) gave the highest seed weight %, all in comparison with untreated (control) palms, in the 1st season. On contrary to that, the 1st rate of yeast gave the highest seed weight % followed by the 3rd rate, while the 2nd rate gave the best results of seed weight %, all in comparison with untreated (control) palms in the 2nd season.

Concerning the effects of EM_1 rates on seed weight %, it was found that the 1st rate of EM_1 (0.5 cm^3/1L) gave the highest value of seed weight % followed by the 3rd rate (1.5 cm^3/1L), then the 2nd rate of EM_1 (1.0 cm^3/1L) gave the lowest level of seed weight %, all data were compared with untreated (control) ones in the two studied seasons of this study.

In comparison between yeast and EM_1 effects on seed weight %, it could be noticed that EM_1 was more effective in reducing seed weight % in Zaghloul dates than yeast under the conditions of this study.

7) Total soluble solids percentage (TSS%):

Data represented in Table (3) show the changes of total soluble solids % and sugars content of Zaghloul dates as affected by yeast (10, 20 or 30 g/palm) as well as EM_1 (0.5, 1.0 or 1.5 cm^3/1L) in 2003 and 2004 seasons. Obtained results indicated that all treatments with either of yeast or EM_1 significantly increased TSS% in fruit extracts of Zaghloul date palm fruits in comparison with untreated (control) dates in 2003 and 2004 seasons. Furthermore, it could be observed that TSS% in dates significantly increased with increasing rates of yeast during the two studied seasons, where, the highest rate of yeast (the 3rd rate, 30 g/palm) produced the highest level of TSS%, followed by the 2nd rate (20 g/palm), then the lowest rate of yeast (10 g/palm), all compared with untreated (control) ones during the two seasons.

Concerning the effect of EM_1 rates on TSS%, it could be noticed that the 2nd rate of EM_1 (1.0 cm^3/1L) gave the highest value of TSS%, followed by the 1st rate of EM_1 (0.5 cm^3/1L), then the 3rd rate of EM_1 where it gave the lowest level of TSS% in comparison with untreated (control) ones in the 1st season, while during the 2nd season, EM_1 rates induced a slight increase in TSS% in comparison with untreated ones.

In comparing yeast with EM_1 effects on TSS%, it could be deduced that yeast applications were more effective in improving TSS% in Zaghloul dates than EM_1.

These obtained results are in agreement with those found by Gobara (2004) on Zaghloul dates,

Abd El-Moniem *et al*. (2003) on Fagrikalan and Alphonse mango cvs, and Ebrahiem *et al*. (2000) on Balady mandarin, where they deduced that yeast applications increased TSS% in date mango and mandarin fruits. The same results were reported by Joa and Lee (2000) in orange fruits as affected by application of EM solution.

8) Sugars content in dates:

From previously Table (3), it could be mentioned that, all treatments with yeast or EM_1 resulted in significant increases in total sugars % in dates and showed the same trend of TSS% in comparison with untreated (control) ones during the two studied seasons. Moreover, yeast applications induced more positive effective in improving total sugar % rather than EM_1.

Concerning the effect of applied yeast rates on reducing sugar %, it was found that all rates of yeast induced significant increase in reducing sugar % in the two studied seasons, except the 1st or 2nd rate of yeast applied at the 2nd season which caused a slight decrease in reducing sugars % in dates in comparison with untreated (control) dates.

Moreover, the highest rate of yeast (the 3rd rate, 30 g/palm) produced the highest level of reducing sugar % in Zaghloul dates in the two studied seasons.

Regarding the effects of EM_1 rates on reducing sugar % in dates, it could be noticed that all applied rates of EM_1 resulted in significant increase in reducing sugar % in Zaghloul dates in comparison with untreated (control) dates in 2003 and 2004 seasons.

Concerning the effects of yeast rates on non-reducing sugar % in dates, it was clear observed that the 2nd rate of yeast (20 g/palm) produced fruits with the highest level of non-reducing sugar %, followed by the 3rd rate of yeast (30 g/palm), then the 1st rate of yeast (10 g/palm) in 2003 and 2004 seasons compared with untreated (control) dates. On the other hand, non-reducing sugars % in dates increased with increasing rates of EM_1 during the two seasons, all in comparison with untreated (control) dates.

Moreover, it could be noticed that yeast rates gave the best results obtained of this parameter.

Such dates quality improvement due to using active dry yeast may be due to enhancing photosynthesis enhanced and hormone promotion, which advanced fruit maturity and sugars content in dates.

These obtained results of this study confirm early findings reported by Gobara (2004) on Zaghloul dates, Ebrahiem *et al*. (2000) on Balady mandarin, Eman *et al*. (2003) on mango cvs, and Mostafa and Abou-Raya (2004) on

banana cv., where they reported that yeast applications increased sugar content % in fruit juice of fruit tree cvs studied. As well as, Joa and Lee (2000), and Paschoal (2000) pointed out that EM application on orange trees resulted in improving sugars content in fruit juice.

Table(3): Effect of yeast and effective microorganisms (EM_1) applications on some chemical characteristics of Zaghloul date palm in 2003 and 2004 seasons.

Treatments	Season 2003				Season 2004			
	Total soluble solids (%)	Sugar content % on fresh weight basis			Total soluble solids (%)	Sugar content % on fresh weight basis		
		Total sugars	Reducing sugars	Non-reducing sugars		Total sugars	Reducing sugars	Non-reducing sugars
Control	28.28	25.79	13.05	12.73	29.00	28.09	17.79	10.31
Yeast (10 g/palm)	29.33	26.28	14.41	11.86	29.83	28.40	16.16	12.22
Yeast (20 g/palm)	31.17	26.80	13.89	12.91	32.17	30.58	17.53	13.06
Yeast (30 g/palm)	39.67	27.64	14.87	12.77	35.33	32.73	20.38	12.35
EM_1 (0.5 cm^3/1L)	33.33	25.98	13.65	12.33	29.50	28.05	17.15	10.89
EM_1 (1.0 cm^3/1L)	38.67	26.69	14.22	12.48	29.83	29.29	17.39	11.90
EM_1 (1.5 cm^3/1L)	29.67	25.85	13.33	18.51	29.90	30.60	18.50	12.09
L.S.D. 0.05	1.29	0.50	0.64	0.39	1.43	0.65	1.15	0.82

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التأثيرات الفسيولوجية لإضافة الخميرة والكائنات الدقيقة الفعالة على نخيل البلح الزغلول

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أجريت هذه الدراسة على نخيل البلح الزغلول المنزرع بمزرعة كلية الزراعة جامعة أسيوط خلال موسمى 2003 ، 2004 بهدف تحسين خصائص الثمار الطبيعية والكيميائية بإضافة الخميرة (10، 20 ، 30 جم / النخلة) ومحلول الكائنات الدقيقة الفعالة (EM_1 ، 0.5 ، 1.0 ، 1.5 سم3 باللتر) إلى التربة فى طور الحبابوك للثمرة (أربعة أسابيع بعد التلقيح) ، ولقد خصص لهذه الدراسة 21 نخلة حيث صممت التجربة بنظام القطاعات كاملة العشوائية بمعدل ثلاثة نخلات لكل معاملة مع ترك 9 أغاريض بالنخلة (حوالى 8 أوراق / إغريض) وتم تلقيحها بذكر واحد خلال موسمى الدراسة . وتم دراسة وزن السوباطة ، النسبة المئوية للثمار المتبقية ، وزن وحجم الثمرة وأبعادها ، وزن اللحم والنسبة المئوية لوزن البذرة / الثمرة ، علاوة على الصفات الكيميائية للثمرة متضمنة نسبة المواد الصلبة الذائبة الكلية (TSS%) ، النسبة المئوية للمكونات السكرية (الكلية، المختزلة ، وغير المختزلة) وذلك فى مستخلص ثمار البلح ومدى تأثرها بالمعاملة بالخميرة أو محلول الكائنات الدقيقة الفعالة (EM_1) . ويمكن تلخيص أهم النتائج من هذه الدراسة فيما يلى :

- أدت جميع المعدلات المستخدمة من الخميرة الجافة النشطة أو محلول الكائنات الدقيقة الفعالة (EM_1) إلى تحسين خصائص ثمار البلح الزغلول الطبيعية والكيميائية

- كانت أحسن النتائج المتحصل عليها من المعاملة بالمعدل المتوسط من الخميرة (20 جم / النخلة) وكذلك التركيز المتوسط من محلول الـ EM_1 (1.0 سم3/1 لتر) .

وعليه يمكن التوصية بإضافة الخميرة الجافة والنشطة بمعدل 20 جم / النخلة) أو محلول الكائنات الفعالة الدقيقة (EM_1) بتركيز 1.0 سم3 /1 لتر / النخلة) فى طور الحبابوك للثمرة (أربعة أسابيع بعد التلقيح) وذلك للحصول على أحسن محصول مع أفضل صفات جودة لثمرة البلح الزغلول المنزرع تحت ظروف أسيوط .