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INFLUENCE OF $CACL_2$, MELLOW-FALCS AND YEAST ON SOME CHARACTERISTICS OF VEGETATIVE AND FRUITS OF LOCAL PEAR TREES

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Abstract

This investigation was carried out to evaluate the effect of some chemical treatments to enhance some characteristics of vegetative and fruits of local pear trees cv. Katony. It was performed during season 2018 in orchard at AL-Abbasyia, Najaf Governorate . The trees were spraying with $CaCl_2$ at concentrate 1%, Mellow-falcs 250 mg / L and yeast 0.1%, 0.2%, in single way or combination after 60 days from full bloom stage. Fruits were picked after 95 days from full bloom. The experiment included 12 treatments with three replicates. It is adopted according to Randomized Complete Block Design (RCBD), and the results were statistically analyzed according to LSD test at the probability level of 5%. The result indicated that the leaf aria, total chlorophyll, shoot length, length, diameter, weight, volume, firmness, humidity of fruits, Calcium pictate and percentage of Calcium increasing in single way or combination treatments. Also reduced percentage of fruit drupe, percentage acidity, T.S.S, Vitamin C, Carotene pigment in fruit peel of fruits in maturity stage. There was significant differences between these treatments compared to control treatment. It can be recommended from the present study to apply the enhancement chemical treatments after 60 days from full bloom as they gave better results and caused significant improvement in vegetative and most of the studied fruit characteristics. The treatment of (Ca 1%+ Mellow-falcs 250 mg / L + yeast 0.2%) gave the highest rate of parameters studied.

Key words : Pears, $CaCl_2$, Mellow-falcs and yeast, fruit characteristics.

Introduction

Pear fruit is one of the favorite fruits of temperate zone and is considered the third of deciduous fruits and the fourth among all fruits in its global distribution (F.A.O, 2017). AL – Hamdawi *et al.,* (2018) noted that spraying fig trees cv. As wod Diala with $CaCl_2$ at concentrate 1% was increased the leaf aria, total chlorophyll, shoot length, number of shoot, humidity of fruit, firmness of fruit, calcium pictate, percentage of calcium and decreased the anthocyanine pigment in fruit pee, total soluble sold and vitamin C significantly compared to control treatment. AL – Hamdawi *et al.,* (2006) observed that spraying fig tress cv. "Waziri" after one week from rest period of fruits with Ca at conc. of 1% increased length, diameter of fruit, total yield of trees, total soluble solids, total sugar, vitamin C anthocyanine pigment in fruit and firmness compared with control treatment.

Al – Hamdawi *et al.,* (2018) found that spraying pear trees with Beta Naphthoxy acetic acid (100, 200 and 300 mg / L) caused a significant increased leaf aria, total chlorophyll, shoot length, length, diameter, weight, volume, firmness, Calcium pictate and humidity of and reduced percentage of fruit drupe, percentage of cracking, T.S.S, acidity and Vitamin C of fruits. AL-Shmery (2013) noticed that, spraying the local apple trees cv. Red summer with three concentrations of NAA (50, 75 and 100) mg / L, GA3 (100,125 and 150) mg / L after 50 days from full bloom stage and picked fruits after 120 days from full bloom, there was a significant indicated that length, diameter, weight, firmness and humidity of fruits increased with increase concentration of NAA, GA3, also these treatments reduced the percentage of cracking, dropping, T.S.S, acidity and Vitamin C of fruits. AL – Ebraheme (2013) noticed that, spraying apple cv. Read summer tress with two concentration of NAA (25 and 50) mg/L, and castor oil (2 and 4)% and combination treatment between them produced increasing significant in the moisture peels, pulp, juice percentage and reducing the cracking, T.S.S, acidity, anthocyanine on peels and

vitamin C in juice during fruits ripening. AL – Noumani (2013) found that spraying local apple after 50 days from full bloom with Grofalcsat conc. of (200, 300 and 400) mg/L led to reduction in percentage of fruit dropping and cracking and increased total soluble solids, total sugar, vitamin C and firmness at ripening. The possibility of using the active bread yeast for improving growth and productivity of fruit crops was mentioned by Suriabananont (1992) and Stino *et al.,* (2009). However, the various positive effects of applying active bread yeast as a newly used bio-fertilizer were attributed to its own component from different nutrients, higher percentage of proteins, massive amount of vitamin B and the natural plant growth hormone namely cytokinins. In addition, application of active bread yeast was very effective in releasing CO_2, which reflected on improving net photosynthesis (Ferguson *et al.,* 1987; Idso *et al.,* 1995 and Hashem *et al.,* 2008). Nowadays, Breed yeast (*Saccharomyces cervisiae*) as a natural bio-stimulant appeared to induce an astonished influence on growth and yield of many crops, since it has various basic function, *i.e.* CO_2 production as well as formation of alcohol, acids and esters (Magoffin and Hoseney, 1974 and Martinez- Anoya *et al.,* 1990). The main objective of this investigation is to study of the effect of spraying with Calcium, Beta Naphthoxy acetic acid and breed yeast on some vegetative and fruit characteristics during ripening.

Materials and Methods

This study was conducted in a private farm at Abbasiya / Najaf governorate for the season 2018 on pear trees cv. Katony, 36 at same size and growth trees were selected with 12 years of age, that planted on (5 × 5 m). The experiment included 12 treatments with three replicates. It is a adopted according to Randomized Complete Block Design (RCBD), and the results were statistically analyzed according to LSD test at the probability level of 5% (Al-Rawi and Khalf Allah, 2000). Treatments were adopted after 60 days from full bloom stage, spraying was done early morning until wetness was full addendum. Tween 20 was added at conc. of 1cm^2/L. as spreader material. Treatments were as follows:

1. Calcium (Ca) formula calcium chloride $Cacl_2$ – $2H_2O$, Ca. 27.2 conc. of 1%.
2. Mellow-falcs(M-F)(It were discs of (Beta Naphthoxy acetic acid) 50% from the production of Green river company. India), 250 mg / L.
3. Yeast 0.1% : Chemical composition of breed yeast *Saccharomyces cervisiae*a, Protein 47% Nucleic acids 8%, Carbohydrates 33% Lipids 4%, Minerals 8%, Approximate composition of vitamins (mg/g): Thiamine 6-100 Biotin 1.3, Riboflavin 35-50 Cholin 4000, Niacin 300-500 Folic acid 5-13, Pyridoxine HCl 28 Vit-B12 0.001, Pantothenate 70, Approximate composition of minerals (mg/g): Na 0.12, Cu 8.00, Ca 0.75, Se 0.10, Fe 0.02, Mn 0.02, Mg 1.65, Cr 2.20, K 21.00, Ni 3.00, P 13.50, Va 0.04, S 3.90, Mo 0.40, Zn 0.17, Sn 3.00, Si 0.03, Li 0.17.
4. Yeast 0.2%.
5. Ca + M-F.
6. Ca + yeast 0.1.
7. Ca + yeast 0.2.
8. M-F + Ca + yeast 0.1.
9. M-F + Ca + yeast 0.2.
10. Ca + M-F + Ca + yeast 0.1.
11. Ca + M-F + Ca + yeast 0.2.
12. Control.

Ten normal fruits were taken at random after 95 days from full bloom from each tree for quality determination. leaf aria $cm^{2.}$ Total chlorophyll mg / 100g dray weight, Shoot length cm, % Fruit drop, Length of fruit (cm), diameter of fruit (cm), weight of fruit (gm), Volume of fruits (cm^3) and percentage humidity of fruits according to (Ibrahim, 2010). The juice was extracted and the percentage acidityas citric acidcontent using fresh juice with titration against 0.1 Na OH., total soluble solids were determined by hand refract meter. Vitamin C mg /100 ml Juice and carotene pigment in fruit peel according to (A.O.A.C, 1985). Firmness was measured on two sides of each fruit with an Effegi penetrometer (Model NI, McCormick Fruit Tech, Yakima, WA) Fitted with an 11.1mm tip. The Calcium determination according to Gresseand Parson (1979). Calcium pictate was determined according to (Rouhani and Bassiri, 1976). Firmness was measured on two sides of each fruit with an Effegi penetrometer (Model NI, McCormick Fruit Tech, Yakima, WA) Fitted with an 11.1mm tip.

Results and Discussion

Leaf aria, total chlorophyll, shoot length, number of shoot, length, diameter, weight, volume, firmness, humidity of fruits, Calcium pictate and percentage of Calcium

Data in (Table 1, 2) shows that, spraying Calcium chloride, Mellow-falcs and yeast alone or combination treatments led to increased leaf aria, total chlorophyll, shoot length, number of shoot, length, diameter, weight, volume, firmness, humidity of fruits, Calcium pictate and percentage of Calcium that gave the highest rates (36.16

cm^2 / leaf, 115.29 mg / 100 g, 33.20 cm, 6.33, 9.90cm, 6.68cm, 89.47gm, 89.75cm^3, 78.87%, 9.87 kg/cm^2, 3.48% and 0.81%) in the treatment ($Cacl_2$ 1% + Mellow-falcs250mg/L% + yeast 0.2%) in comparison to the lowest values rates (52.97 cm^2 / leaf, 95.46 mg / 100 g, 2265 cm, 3.00,5.18 cm, 3.40 cm, 85.76 gm, 85.87cm^3, 76.50%, 8.327 kg/cm^2 1.87% and 0.65%) in control treatment . The reason of increasing the leaf aria, total chlorophyll, shoot length, number of shoot, length, diameter, weight, volume, firmness, humidity of fruits, Calcium pictate and percentage of Calciumas a result of the experiment treatments. Above mentioned treatments led to the root system in absorption the nutrients elements in which some of them are parts of chlorophyll which led to increase its quantity in comparison control treatment. This process increases photosynthesis an activate plant growth which led to enhance hormones synthesis (Salvatava *et al.*, 2006) and due to the fact that auxins and gibberellins work as center to aggregation nutrient materials and enhancing the speed of transferring materials from leaves to fruits(Jundi, 2003). The increase in firmness in fruits due to spraying trees with Calcium and auxins because these treatments plays an important role in strengthening the cell walls through its role in enhancing pectin coherence which increases the thickness of cell walls, which makes it more strength and stiffness to resist pectin analysis enzymes Byers and Carbough (1995). Besides that increasing in the fruit length, cell size, leaf aria, total chlorophyll were obtained due to the treated of effect. This act leads to enhance the photosynthesis process and transfer materials to fruits and in large increase in total growth. The higher rates of Calcium pictate and calcium in the fruit contents were due to the process of spraying of the Ca led to increased concentration of these elements in the fruits and thus its rates increased in fruit compared to the untreated trees.

Percentage of fruit drupe, percentage acidity, T.S.S, Vitamin C, Carotene pigment in fruit peel

Results indicated in Table 2 that, spraying with Calcium chloride, Mellow-falcs and yeast alone or combination has led to significantly decreased the percentage of fruit drupe, percentage acidity, T.S.S, Vitamin C, Carotene pigment in fruit peel compared to control treatment. The highest significance result were recorded in control treatment, that gave the highest percentages, they were (17.43%,1.07, 12.93%, 7.17 mg / 100 ml Juice and 41.25 mg / 100g peel) comparison with (6.81%,0.06, 12.08%, 6.47 mg / 100 ml Juice and 36.85 mg / 100g peel) in treatment ($Cacl_2$ 1% +Mellow-falcs 250mg/L% + yeast 0.2%) respectively. Decreasing fruits from percentage acidity, T.S.S, Vitamin C, Carotene pigment in fruit peel fruits which results through spraying with this material due to the fact that this compound increase in the percentage of fruit water contents which intern reducing the concentration of materials in fruit juice (Devlin and Witham, 2001). The decreasing in the fruit dropping percentage due to auxins spraying could be attributed for prevention cell wall middle lamella analysis in abscission zone through decreasing the action of ethylene, peroxidase and IAA- Oxidase enzymes which resulted in the physiological analysis occurring to the cell wall (Dell, 2013).

Table 1: Effect of spraying of$CaCl_2$,M-F and yeast on vegetative growth and physical characters fruits of local bear cv. Katony for season 2018.

Treatments	leaf area cm^2	Total chlorophyll mg / 100g	Shoot length cm	Number of shoot	% Fruit drop	Length of fruit cm	Diameter of fruit cm	weight of fruit gm	Volume of fruits cm^3
Control	25.97	95.46	22.65	3.00	17.43	5.18	3.40	85.76	85.87
$CaCl_2$	28.34	98.25	25.17	4.75	14.19	6.30	4.70	87.55	86.91
M-F	32.56	101.06	27.91	5.50	10.67	6.94	4.87	87.68	86.69
Yeast at 0.1%	30.98	101.18	24.83	3.33	12.55	6.80	4.98	87.90	87.13
Yeast at 0.2%	31.15	100.85	25.00	4.70	12.20	6.95	4.65	88.00	87.50
$CaCl_2$+M-F	33.70	103.22	25.56	5.15	9.32	7.13	4.79	88.65	87.98
$CaCl_2$+ Yeast at 0.1%	31.90	105.33	26.19	5.70	9.60	7.25	4.85	88.79	88.17
$CaCl_2$+ Yeast at 0.2%	32.35	109.11	26.81	6.00	8.89	7.78	5.53	88.75	87.81
M-F + Yeast at 0.1%	33.90	108.31	26.43	6.15	8.75	7.64	5.65	88.82	88.29
M-F + Yeast at 0.2%	34.20	110.46	29.27	6.30	8.26	8.11	5.84	88.96	87.92
$CaCl_2$ + M-F + Yeast at 0.1%	34.75	112.53	29.90	6.13	7.94	8.76	6.26	89.12	88.42
$CaCl_2$ + M-F + Yeast at 0.2%	36.16	115.29	33.20	6.33	6.81	9.90	6.68	89.47	89.75
L. S. D. 0.05	1.05	0.89	1.24	0.62	0.97	0.75	0.36	0.28	0.52

Table 2: Effect of spraying of$CaCl_2$,M-F and yeast on physical and chemical characters of fruit growth of local pear treesfor season 2018.

Treatments	% humidity of fruit	Acidity %	% Total soluble sold	Vitamin C mg / 100 ml Juice	Carotene-pigment in fruit peel mg / 100g peel	Firmness Kg/cm²	% calcium pictate	Ca %
Control	76.50	1.07	12.93	7.17	41.25	8.32	1.87	0.65
$CaCl_2$	77.34	1.01	12.75	7.01	40.68	8.68	2.29	0.68
M-F	76.87	0.93	12.61	6.90	40.41	8.53	2.83	0.67
Yeast at 0.1%	76.99	0.87	12.79	7.05	40.36	8.60	1.90	0.64
Yeast at 0.2%	76.95	0.98	12.72	6.98	40.41	8.49	1.81	0.67
$CaCl_2$+M-F	77.07	0.85	12.70	7.08	40.28	8.72	2.96	0.77
$CaCl_2$+ Yeast at 0.1%	77.14	0.81	12.68	6.96	39.83	8.80	2.59	0.70
$CaCl_2$+ Yeast at 0.2%	77.24	0.97	12.71	6.90	39.69	8.93	2.99	0.79
M-F + Yeast at 0.1%	77.20	0.88	12.55	6.86	39.57	9.13	3.10	0.75
M-F + Yeast at 0.2%	77.40	0.80	12.34	6.85	39.18	9.22	3.19	0.80
$CaCl_2$ + M-F + Yeast at 0.1%	78.25	0.07	12.30	6.70	38.29	9.59	3.25	0.78
$CaCl_2$ + M-F + Yeast at 0.2%	78.87	0.06	12.08	6.47	36.85	9.87	3.48	0.81
L.S.D. 0.05	0.49	0.05	0.20	0.11	0.21	0.13	0.28	0.04

Conclusion

It could be concluded from this experiment that, spraying $CaCl_2$. Mellow-falcs and yeast, in single way or combination led to an increase in the leaf aria, total chlorophyll, shoot length, length, diameter, weight, volume, firmness, humidity of fruits, Calcium pictate and percentage of Calcium and reduced percentage of fruit drupe, percentage acidity, T.S.S, Vitamin C, Carotene pigment in fruit peel in maturity stage compared to control treatment. The treatment of (Ca 1%+ Mellow-falcs 250 mg / L + yeast 0.2%) gave the highest rate of parameters studied with significant differences between treatments.

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