Effect of some Treatments for Improving Vegetative Growth, Leaf Mineral Compositions, Fruit Set, Yield, Fruit Quality and Limitation of Flowers and Fruits Abscission of "Le Conte" Pear Trees at El-Nubaria Region

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ABSTRACT

The study was carried out during (2006-2007) and (2007-2008) growing seasons on 18 years old Le Conte pear trees grafted on communis rootstock and planted at El-Nubaria Horticultural Research Station, to improve fruit set and to limitat flowers and fruits abscission. Eight treatments beside control were carried out. The main results can be summarized in the following points:

- Borax soil application (27 grn/tree) on First March + Foliar application (100 ppm) at 70% full bloom (T_4) developed the highest significant fruit set, yield per tree, yield efficiency (kg/m^2 of TCA), fruit weight, length and width, shoot length, number and diameter, leaf area and leaf total chlorophyll followed by antistress at 0.66% (T_1), Borax foliar application (100 ppm) at 70% of full bloom + chelate calcium foliar application (2.5 gm/L.) (T_6), Borax (100 ppm) at 70% F. bloom (T_3), GA_3 (20 ppm) at 30% and 70% of F. bloom (T_8), soil application of borax at 27 gm/tree (T_2) and NAA (100 ppm) at 70% full bloom (T_7), respectively, while the untreated trees (control) induced the lowest significant effects, in the both studied years.

- Both of T_5 and T_6 induced the highest significant leaf Ca% followed by T_4 and (T_7, T_1, T_8, T_2 and T_3), since control trees produced the lowest leaf calcium content in both seasons of study.

- T_4 induced the highest significant leaf boron content followed by T_2, T_3, T_1 and T_6, respectively, and (T_5, T_6, T_7, and T_8) as compared with untreated trees (control) which developed the lowest values in the two studied seasons.

INTRODUCTION

Among deciduous fruit crops, "Le Conte" pear tree is considered one of the most important crops in Egypt. There are several factors which had negative effects on the behaviour of this tree, one of these factors is the

flowers and fruits abscission, especially at El Nubaria region, which is caused by many reasons. Boron is one of these reasons; it is required for proper development and differentiation of tissues. In its absence, abnormal formation and development of tissue occurs. Since it is relatively immobile in plants, the early casualties of B deficiency are the young parts of the plant. Boron increases the stability of plant cells and is involved in the reproductive phase of plants, and its inadequacy is often associated with sterility and malformation of reproductive organs. Boron facilitates the transport of carbohydrates through cell membranes. If B deficiency occurs, the assimilation products accumulate in the leaves and the young growing points lack sugar. Thus, maximum production of starch and sugar is restricted if crops are inadequately supplied with B (Katyal and Randhawa, 1983). In addition, calcium is another reason. It functions as a cross-linkage in the pectates of the middle Lamella, which binds cells together. It is also needed in enzymatic reactions (such as in the reduction of NO_3^-), provides a balance of anions and cations in the plant, and plays an important role in the stabilization of cell membranes. It is usually found in combination with pectates, as oxalate crystals and as phosphate. Calcium crystals in many tissues of the tree bind calcium and make it less available for use in tissue; this might explain why apple and pear trees with abundant Ca still develop fruit with bitter pit, a disorder related to low calcium in the fruit (Stebbins *et al.*, 1972). Moreover, Gibberellins are considered an important reason; they take part in cell elongation, aid in breaking rest of seeds and dormant buds, prevent flower initiation, and seem to work with auxin to prevent abscission of young fruits. In addition, NAA is used later in the season to prevent pre-harvest fruit drop (Weaver, 1972) and (Wellensiek, 1972).

Objective of the present work was to study the influence of materials, such as NAA, Boron, Calcium, GA_3, ... etc., on improving fruit set and limitation of flowers and fruits abscission of "Le Conte" pear trees planted in Nubaria region.

MATERIALS AND METHODS

The present study was carried out at El-Nubaria region, El-Behira Governorate, during two successive seasons, (2006-2007) and (2007-2008) on 18 years old of "Le Conte" pear trees (*Pyrus communis* L.X *Pyrus pyrifolia* N.) on *Pyrus communis* rootstock planted in calcareous soil. The analysis of physical and chemical properties the experimental soil's orchard

was determined according to Chapman and Pratt (1961) before starting the trial and some of this analysis had been shown in Table (1).

Table (1): Physical and chemical analysis of soil properties to start experiment.

Texture	pH	Total $CaCo_3$ %	EC. (ds/m^1)	S.P %	O.M %
Sandy loam	8.05	24.01	2.38	49.33	0.55

The treated trees were spaced at 4 x 5 meters apart and were healthy and similar in their vigour, as possible, and treated with normal agricultural practices. Trees were irrigated with flood irrigation using Nile water. Fifty four trees were selected and received the following treatments:

T_1 : Foliar application with Antistress (2 liters/600 L. water 0.66%) at 70% of full bloom. **[Antistress Content:** Acryletic organic 10%, polypeptide enzymes 15%, protein enzyme 20% amino acid enzymes 20%, inert ingredients 29%, vitamin A 1000 LU, vitamin D_3 100 LU and vitamin K_3 0.15 mg/liter] (Yehia *et al.* (2009).

T_2 : Soil application with Borax (27 gm per tree) on first March.

T_3 : Foliar application with Borax (100 ppm) at 70% of full bloom.

T_4 : Included $Treatment_2$ + $Treatment_3$.

T_5 : Foliar application with chelate calcium (2.5 gm/liter) at 70% of full bloom and after 2 weeks.

T_6 : Included $Treatment_3$ + $Treatment_5$.

T_7 : Foliar application with Amecton (NAA) [1 gm/L] or 1000 ppm at 70% full bloom.

T_8 : Foliar application with GA_3 (20 ppm) at 30% and 70% of full bloom.

T_9 : Control.

The experimental treatments were arranged in a complete randomized block design and each treatment was replicated 3 times with 2 trees in each replicate, i.e. 9 treatment x 3 replicates x 2 experimental unit = 54 tree.

The following parameters were used to express the response of the experimental trees to the treatments:

1 - **Vegetative Growth:** [including average, number, length and diameter of new shoot and leaf area]

Four main branches as uniform as possible were chosen at the four cardinal points of each treated tree. Branches were tagged and the average of the current shoot number/selected branch was counted, their length diameter were measured on first November. Average trunk cross-sectional area (cm^2) was determined according to (Westwood, 1988). To determine the leaf area, samples of 10 leaves were collected at random from each studied tree on late August, washed with tap water and dried with a piece of cotton tissue. The determination of leaf area was carried out using leaf area meter (Model CI-203, CID, Inc, U.S.A.).

2 - **Leaf Analyses:**

Leaf total chlorophyll content was determined by using MINOLTA CHLOROPHYLL METER SPAD-502 (Minolta Camera Co., LTD JAPAN). Ten readings were taken was collected on ten leaves (the fourth leaf of the new shoot of each experimental tree on mid July). The reading was taken at the Middle of leaf blade (Abd El-Messeih, 2000).

To study the influence of applied treatments on the leaf mineral composition, samples consisted of twenty mature leaves were collected at random, from the middle part of the outer shoots on late July in the two studied seasons. The leaves were washed several times with tap water, rinsed three times in distilled water, and then dried at 70-80°C in an electric air-drying oven. The dried leaves of each sample were ground in porcelain mortar to avoid contamination with any minerals; 0.3 gm from the ground dried material of each sample was digested with H_2O_2 and H_2SO_4 according to Evenhuis and Dewaard (1980). Suitable aliquots were then taken for mineral determination. Total nitrogen was determined colorimetrically according to Evenhuis (1976). Calcium was measured, using versenate method (Chang and Bray, 1951). Boron was determined by a Perkin-Elmer atomic absorption spectrophotometer Model 305-B. The concentrations of nitrogen and calcium were expressed as percent, while boron was expressed as parts per million (ppm), on dry weight basis.

3 - Fruit set and yield efficiency:

Fruit set percentage: the total number of flowers on each tagged limb was counted at full bloom. The number of set fruits was counted on the same limbs after one month from full bloom. Fruit set percentage was calculated as follows:

Fruit set percentage =

$$\frac{\text{Number of developing fruitlets}}{\text{Total nubmer of flowers}} \times 100$$ (according to Westwood, 1988).

Yield Efficiency: It was calculated according to (Westwood, 1988) using the following equation:

$$\text{Yield Efficiency} = \frac{\text{Yield (Kgs)}}{\text{Trunk cross - sectional area } (cm^2)}$$

Yield and Fruit Quality:

The total fruit yield of each studied tree was determined as weight in Kg per tree in late August of both studied seasons. Twenty mature fruits from each treated tree were taken at random for determining fruit quality. In each sample, fruit weight was recorded as (gm), fruit dimensions [length and diameter in (cm)]; firmness was determined according to (Magness and Taylor, 1925) pressure tester using a 5/16" plunger. Total soluble solids (TSS) in the juice were determined using a hand refractometer, and total sugars content were determined according to Malik and Singh (1980).

The obtained data throughout the two investigated seasons were statistically analyzed according to (Sendecor and Cochran, 1990) and L.S.D. test at 0.05 levels was used for comparison between treatments.

RESULTS AND DISCUSSION

Fruit set %, yield, yield efficiency and fruit quality:

Data in Table (2) and Figs. (1, 2 and 3) indicated that T_4 soil and foliar application of borax induced significantly the highest fruit set percentage, yield (Kg/tree and yield efficiency (Kg/cm^2 of TCA) followed by T_1 (foliar application of antistress; T_3 (foliar application of borax) and T_6 (foliar

application of borax and chelate Ca), respectively, in the two studied seasons. The treatment T_2 (soil application of borax) and T_8 (foliar application of GA_3) induced the same results, also T_5 (foliar effect of chelate Ca) and T_7 (foliar application of Amecton "NAA") induced similar effects, while the significant lowest influence was obtained from control trees in the two years of study. Data in Table (3) showed that T_4 significantly induced high fruit weight (gm), fruit length and width (cm) in the two studied years, followed by T_1, (T_3 and T_6), (T_2 and T_8), T_7 and T_5 for fruit weight. While it was followed by T_3, T_6, T_1, T_8 and T_2, (T_5 and t_7) for fruit length. As for fruit firmness (16/inch$_2$) T_2 and T_6 induced significantly high effect followed by (T_4, T_1 and T_3), T_8, T_5 and T_7, while the significant lowest data were obtained from control trees in both studied seasons. Data in Table (4) indicated that T_1, T_3, T_4 and T_6 caused high T.S.S. %, followed by T_2, T_8, T_7, T_5 and control, respectively in both seasons of study. As for total sugars %, the significant high effect was induced by T_4 and T_1 followed by (T_3 and T_6), (T_2 and T_8), (T_5 and T_7) and control, respectively in the two studied years. Many investigators supported these data. It is believed that pear trees (*Pyrus communis* L.) have a high B requirement and B deficiency causes blossom blat (Kienholz 1942). Larue and Johnson (1989) mentioned that Boron element plays an important role in protein synthesis, sugar transport, hormone anabolism and catabolism and growth of pollen tube. In addition, Rease (1989) reported a typical sign of disorder like dieback of flowers before full bloom with the dead flowers frequently failing to set and yield of B-deficient pear trees are strongly reduced. A major effect of B nutrition in fruit trees is its role in fruit set, Faust (1989). Moreover, roles proposed for B in plants include functions in sugar transport, cell-wall synthesis and structure, carbohydrate metabolism, nitrogen metabolism, respiration, indole acetic acid and phenol metabolism, Blevins and Lukassewsk (1998). On the other side, Khalil and Saied (1993) reported that spraying apricot trees at bloom with GA_3 (30 ppm) or borax (25 ppm) improved fruit set. The present results are in harmony with the previous results obtained by Abd El-Megeed *et al.* (2007) on apricot trees who found that GA_3 at 20 ppm and Borax at 15 ppm improved fruit set, yield and fruit quality. Storer *et al.* (1999) found that pre-bloom GA_3 foliar application enhanced cropping of Empire and McIntosh apple trees by 22% and 35%. Moreover, Abd El-Megeed and Abd Elfattah (2007) outlined that the highest yield and fruit weight of "Le Conte" pear trees were recorded with the combination of boric acid at 0.2% + chelated calcium at 0.3% treatment as compared to the control, chelated calcium increased TSS % alone or combined with boric acid. Furthermore, Yehia *et al.* (2009) reported that spraying "Le Conte"

pear trees with Antistress at 0.066% enhanced fruit set, fruit weight, volume and TSS % and yield.

Vegetative Growth:

Data in Table (5) showed that vegetative growth of "Le Conte" pear trees in 2007 and 2008 seasons for all investigated treatments. In both years of study T_4 significantly induced the highest shoot number, length and diameter and leaf area followed by T_1, T_3 and T_2 (except shoot length for T_2), T_6, T_8, T_7 and T_8. The significant lowest results were obtained from control trees (untreated). Many workers supported these data. Marschner (1995) reported that boron is an essential microelement required for the normal growth of higher plants. Fawzia *et al.* (2008) demonstrated that soil application of 80 gm boric acid + 160 gm chelated Ca to pear tree 3 times induced the highest significant spur leaf area and leaf total chlorophyll. On the other side, the stimulation effect of Antistress (polypeptides polyamine enzyme) on tree growth is in harmony with many investigators, such as Kakkar (2002) who indicated that PA_s low molecular mass polycations are very important cell compounds essential for normal growth of prokaryotic and eukaryotic cells. In addition, Yehia *et al.* (2009) outlined that spraying Le Conte pear trees with Antistress at 0.66% stimulated the systemic acquired resistant (SAR) to fireblight disease, at the same time protein banding patterns profile data appearing absent band with molecular weight 21 KD_a in untreated trees which induced highly disease infection, this band could be considered as gene marker for protein related pathogen (PR-1) as a sort of SAR.

Leaf Chemical Content:

Data in Table (6) show the leaf chemical content of "Le Conte" pear trees in both seasons for all studied treatments:

- **Leaf Total Chlorophyll Content (SPAD):**

The treatments T_1 and T_4 induced significantly the highest leaf total chlorophyll (SPAD) in both studied seasons followed by (T_3, T_6 and T_2), (T_8, T_5 and T_7), while the lowest results were obtained from untreated trees (control). Fawzia *et al.* (2008) supported these findings, they demonstrated that soil application of 80 gm boric acid + 160 gm chelated Ca to "Le Conte" pear trees induced the highest significant leaf total chlorophyll.

- **Leaf Nitrogen Content (%):**

Concerning leaf N % content, the studied treatments could be arranged as follows: $T_4 > T_1 > T_3$ and $T_6 > T_2$, T_5, T_8 and T_7 > control, the differences were generally significant in both studied seasons. Many findings agree with these data, Kabeelt *et al.* (1999) indicated that foliar B application to "Le Conte" pear trees at full bloom increased leaf content of most macro elements including N, P, K and Ca and micro elements such as boron.

- **Leaf Calcium Content (%):**

Data in Table (6) cleared that T_5 and T_6 significantly induced the highest leaf Ca % content followed by (T_4 "T_1 and T_7 in the first season", "T_1 and T_7 in the second season", T_2, T_3 and T_8), while control trees induced the lowest values in both studied years. These data are in harmony with those obtained by Rease and Drake (1995). They demonstrated that calcium sprays of "Anjou" pear trees increased fruit calcium concentration. In addition, foliar B sprays before full bloom or after harvest increased calcium concentration in leaves at 120 days after full bloom of pear trees (WoJcik and WoJcik, 2003). Moreover, foliar calcium application increased calcium concentration in Jonagold apple fruits (WoJcik, and WoJcik 2005).

Leaf boron content (ppm):

Data in Table (6) indicated that T_4 significantly induced the highest leaf B content (ppm) in both years of study followed by T_2, T_3 and T_1, while the lowest values were obtained from control trees, the remaining treatments were in-between. Many workers supported these finding. Kabeel *et al.* (1999) demonstrated that foliar B application to "Le Conte" pear trees increased leaf boron content (ppm). In addition, Noyomora *et al.* (1999) reported that foliar B application to almond trees in February induced optimal effect on tissue B concentration. Likewise, WoJcik and WoJcik (2003) mentioned that foliar B sprays before full bloom or after harvest increased B concentration in flowers, leaves and fruitlets at 40 days after flowering.

CONCLUSION

"Le Conte" pear trees planted in calcareous soil suffer from several problems which induced a negative effect on its growth, yield and fruit quality. One of severe problems is the lack of available macro and micro

elements which caused unbalance in hormonal system inside the plant and in turn, reduced vegetative growth, flower and fruit abscission, causing (as indirect reason) a reduction in yield and fruit quality. In order to improve tree growth and production and to obtain a fruit of good quality, eight treatments beside control were studied. These treatments included foliar and soil application of (borax, Antistress, chelate calcium, GA_3 and NAA). It was found that the best treatment is T_4 ("soil application 27 gm/tree + foliar application 100 ppm of borax") followed by T_1 (foliar application of Antistress 0.66%) so they are recommended.

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Table (2): Effect of studied treatments on fruit set%, yield, and yield efficiency of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

Treatments	Fruit Set %		Yield Kgm/tree		Yield efficiency Kgm/cm² of TCA	
	2007	2008	2007	2008	2007	2008
Antistress (T_1) [Foliar application 0.66%]	17.45^{b}	18.11^{b}	11.80^{b}	43.77^{b}	0.194^{b}	0.197^{b}
Borax (T_2) [Soil application 27 gm/tree]	14.82^{d}	15.18^{c}	33.62^{e}	35.12^{e}	0.156^{e}	0.158^{e}
Borax (T_3) [Foliar application 100ppm]	16.21^{c}	16.48^{bc}	39.22^{c}	40.72^{c}	0.182^{c}	0.186^{c}
Borax (T_4) [Soil ap. 27 gm/tree + Foliar ap. 100 ppm]	20.12^{a}	21.33^{a}	46.33^{a}	49.18^{a}	0.215^{a}	0.248^{a}
Chelate Ca (T_5) [Foliar application 2.5 gm/liter]	11.56^{e}	12.52^{d}	28.45^{f}	30.95^{f}	0.132^{f}	0.138^{f}
Borax + Chelate Ca (T_6) [Foliar Application 100 ppm + 2.5 gm/liter]	16.25^{c}	17.14^{b}	37.71^{d}	39.21^{d}	0.175^{d}	0.180^{d}
Amecton (T_7) [Foliar application 1000 ppm]	11.65^{e}	12.55^{d}	29.52^{f}	31.12^{f}	0.137^{f}	0.139^{f}
GA_3 (T_8) [Foliar application at 20 ppm]	13.98^{d}	14.84^{c}	33.19^{e}	34.69^{e}	0.154^{e}	0.157^{e}
Control (T_9)	6.18^{f}	6.21^{e}	20.61^{g}	21.33^{g}	0.096^{g}	0.098^{g}
L.S.D. at 0.05	1.136	1.697	1.248	1.000	0.006	0.006

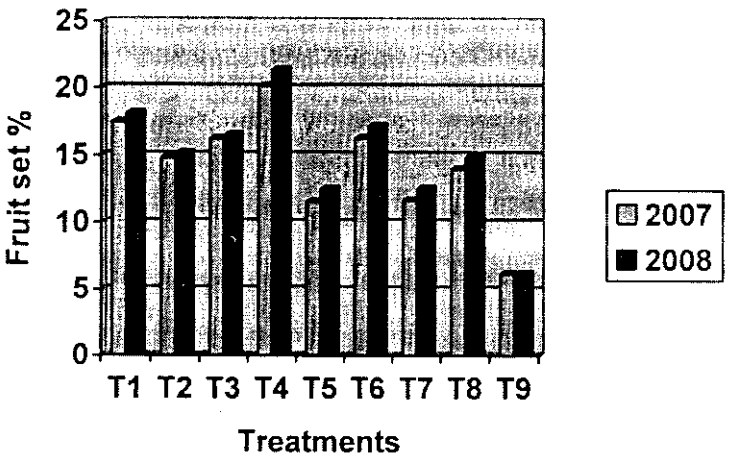

Fig. (1): Effect of studied treatments on fruit set % of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

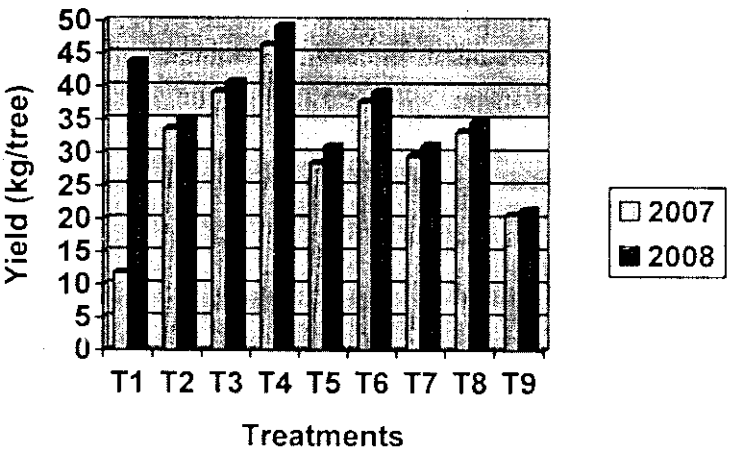

Fig. (2): Effect of studied treatments on yield (kg/tree) of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

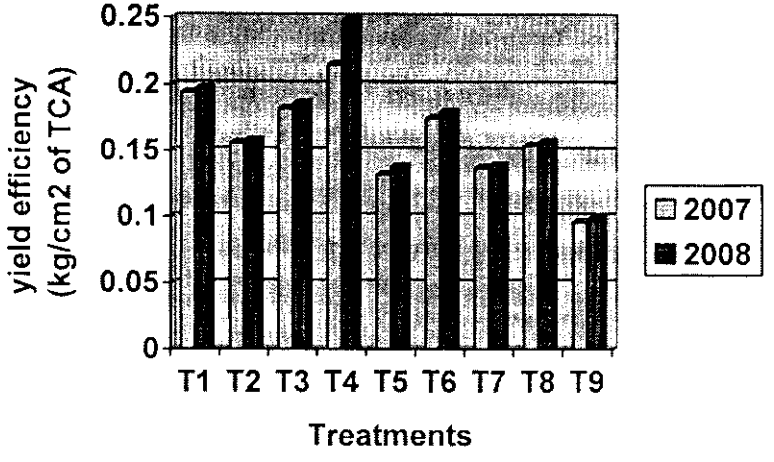

Fig. (3): Effect of studied treatments on yield efficiency (kgm/cm^2 of TCA) of "Le Conte" pear trees planted in calcareous soil during 2007c and 2008 years.

Table (3): Effect of studied treatments on physical fruit quality of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

Treatments	Fruit weight (gm)		Fruit length (cm)		Fruit width (cm)		Fruit firmness p/inch2	
	2007	2008	2007	2008	2007	2008	2007	2008
Antistress (T_1) [Foliar application 0.66%]	149.32^{b}	156.26^{b}	6.72^{d}	6.74^{c}	6.67^{a}	6.67^{b}	11.86^{b}	11.88^{c}
Borax (T_2) [Soil application 27 gm/tree]	120.21^{e}	125.08^{e}	6.41^{f}	6.45^{e}	6.36^{b}	6.39^{c}	12.14^{ab}	12.16^{a}
Borax (T_3) [Foliar application 100ppm]	131.60^{d}	145.37^{c}	6.92^{b}	6.94^{b}	6.65^{a}	6.67^{b}	11.84^{b}	11.89^{bc}
Borax (T_4) [Soil ap. 27 gm/tree + Foliar ap. 100 ppm]	165.50^{a}	175.68^{a}	7.50^{a}	7.92^{a}	6.7^{a}	6.80^{a}	11.85^{b}	11.92^{b}
Chelate Ca (T_5) [Foliar application 2.5 gm/liter]	101.57^{g}	110.49^{f}	6.323^{g}	6.35^{f}	6.11^{c}	6.14^{d}	11.16^{c}	11.17^{e}
Borax + Chelate Ca (T_6) [Foliar Application 100 ppm + 2.5 gm/liter]	134.62^{c}	140.15^{d}	6.76^{c}	6.77^{c}	6.62^{a}	6.65^{b}	12.11^{a}	12.14^{a}
Amecton (T_7) [Foliar application 1000 ppm]	105.39^{f}	111.42^{f}	6.33^{g}	6.36^{f}	6.12^{c}	6.16^{d}	11.18^{c}	11.19^{e}
GA_3 (T_8) [Foliar application at 20 ppm]	118.56^{e}	123.84^{e}	6.64^{e}	6.65^{d}	6.35^{b}	6.38^{c}	11.77^{b}	11.78^{d}
Control (T_9)	73.58^{h}	76.15^{g}	5.91^{h}	5.94^{g}	5.85^{d}	5.86^{e}	11.06^{c}	11.10^{f}
L.S.D. at 0.05	1.782	1.482	0.037	0.037	0.202	0.052	0.185	0.037

Table (4): Effect of studied treatments on chemical fruit quality of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

Treatments	T.S.S. %		Total sugars %	
	2007	2008	2007	2008
Antistress (T_1) [Foliar application 0.66%]	13.12^{a}	13.15^{a}	11.84^{a}	11.85^{b}
Borax (T_2) [Soil application 27 gm/tree]	12.88^{bc}	12.92^{b}	9.89^{c}	9.95^{d}
Borax (T_3) [Foliar application 100ppm]	13.12^{a}	13.14^{a}	10.09^{b}	10.12^{c}
Borax (T_4) [Soil ap. 27 gm/tree + Foliar ap. 100 ppm]	13.14^{a}	13.16^{a}	11.86^{a}	11.92^{a}
Chelate Ca (T_5) [Foliar application 2.5 gm/liter]	12.55^{d}	12.62^{d}	9.54^{d}	9.63^{e}
Borax + Chelate Ca (T_6) [Foliar Application 100 ppm + 2.5 gm/liter]	13.11^{ab}	13.13^{a}	10.12^{b}	10.14^{c}
Amecton (T_7) [Foliar application 1000 ppm]	12.65^{cd}	12.68^{c}	9.55^{d}	9.65^{e}
GA_3 (T_8) [Foliar application at 20 ppm]	12.68^{cd}	12.87^{b}	9.87^{c}	9.92^{d}
Control (T_9)	10.12^{e}	10.13^{e}	8.62^{e}	8.80^{e}
L.S.D. at 0.05	0.230	0.052	0.037	0.052

Table (5): Effect of studied treatments on the vegetative growth of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

Treatments	Shoot number		Shoot length (cm)		Shoot diameter (cm)		Leaf area (cm^2)	
	2007	2008	2007	2008	2007	2008	2007	2008
Antistress (T_1) [Foliar application 0.66%]	11.84^{b}	12.14^{b}	82.65^{b}	83.77^{b}	1.04^{b}	1.11^{b}	25.76^{ab}	26.14^{b}
Borax (T_2) [Soil application 27 gm/tree]	9.97^{c}	10.95^{c}	77.18^{d}	78.12^{d}	0.93^{c}	0.97^{c}	24.22^{bc}	24.56^{b}
Borax (T_3) [Foliar application 100ppm]	10.14^{c}	10.92^{c}	79.95^{c}	81.92^{c}	1.01^{b}	1.09^{b}	24.26^{bc}	24.76^{b}
Borax (T_4) [Soil ap. 27 gm/tree + Foliar ap. 100 ppm]	12.45^{a}	14.65^{a}	86.98^{a}	89.21^{a}	1.12^{a}	1.21^{a}	27.12^{a}	28.88^{a}
Chelate Ca (T_5) [Foliar application 2.5 gm/liter]	8.77^{d}	9.11^{e}	73.95^{e}	74.88^{e}	0.88^{d}	0.90^{d}	23.86^{c}	23.92^{c}
Borax + Chelate Ca (T_6) [Foliar Application 100 ppm + 2.5 gm/liter]	10.18^{c}	10.33^{d}	80.11^{c}	81.91^{c}	1.02^{b}	1.12^{b}	24.16^{bc}	24.49^{b}
Amecton (T_7) [Foliar application 1000 ppm]	8.85^{d}	9.12^{e}	74.12^{e}	75.16^{e}	0.89^{d}	0.91^{d}	23.92^{c}	23.96^{b}
GA_3 (T_8) [Foliar application at 20 ppm]	9.94^{c}	10.21^{d}	75.65^{de}	76.81^{d}	0.94^{c}	0.97^{c}	24.12^{bc}	24.52^{b}
Control (T_9)	7.12^{e}	7.21^{f}	65.14^{f}	65.21^{f}	0.76^{e}	0.79^{e}	20.26^{d}	20.34^{c}
L.S.D. at 0.05	0.330	0.392	1.914	1.356	0.037	0.037	1.828	2.601

Table (6): Effect of studied treatments on leaf chemical content of "Le Conte" pear trees planted in calcareous soil during 2007 and 2008 years.

Treatments	Leaf total chlorophyll (SPAD)		Leaf N. content (%)		Leaf Ca. content (%)		Leaf boron (ppm)	
	2007	2008	2007	2008	2007	2008	2007	2008
Antistress (T_1) [Foliar application 0.66%]	39.18^{ab}	39.64^{ab}	2.11^{b}	2.16^{b}	1.24^{bc}	1.25^{c}	21^{cd}	21^{d}
Borax (T_2) [Soil application 27 gm/tree]	36.231^{cd}	36.32^{cd}	2.00^{d}	2.02^{de}	1.22^{C}	1.23^{C}	26^{B}	28^{B}
Borax (T_3) [Foliar application 100ppm]	37.85^{abc}	38.12^{bc}	2.06^{c}	2.09^{c}	1.21^{c}	1.24^{c}	23^{c}	24^{c}
Borax (T_4) [Soil ap. 27 gm/tree + Foliar ap. 100 ppm]	40.65^{a}	41.55^{a}	2.21^{a}	2.24^{a}	1.26^{b}	1.29^{b}	33^{a}	42^{a}
Chelate Ca (T_5) [Foliar application 2.5 gm/liter]	33.78^{d}	34.16^{d}	1.97^{d}	1.99^{d}	1.33^{a}	1.36^{a}	18^{ef}	19^{e}
Borax + Chelate Ca (T_6) [Foliar Application 100 ppm + 2.5 gm/liter]	37.72^{bc}	38.26^{bc}	2.04^{c}	2.08^{c}	1.32^{a}	1.34^{a}	19de	19^{e}
Amecton (T_7) [Foliar application 1000 ppm]	34.26^{d}	34.41^{d}	1.98^{d}	1.99^{e}	1.23^{bc}	1.25^{c}	17^{fg}	18^{e}
GA_3 (T_8) [Foliar application at 20 ppm]	36.33^{bcd}	36.42^{cd}	2.00^{d}	2.04^{d}	1.22^{c}	1.24^{c}	17^{gf}	18^{e}
Control (T_9)	30.12^{e}	30.14^{e}	1.85^{e}	1.88^{f}	1.16^{d}	1.17^{d}	16^{f}	16^{f}
L.S.D. at 0.05	2.869	2.868	0.037	0.037	0.037	0.037	2.826	1.692

الملخص العربى

تأثير بعض المعاملات على تحسين النمو الخضرى، محتوى الأوراق من العناصر، عقد الثمار، المحصول وجودة الثمار والإقلال من تساقط الأزهار والثمار لأشجار الكمثرى "ليكونت" فى منطقة النوبارية

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أجريت هذه الدراسة خلال موسمى النمو (2006-2007)، (2007-2008) على أشجار الكمثرى عمر 18 سنة مطعومة على أصل الكمثرى "كميونس" ومنزرعة فى محطة بحوث بساتين النوبارية وذلك لتحسين عقد الثمار والإقلال من تساقط الأزهار والثمار. وتم تنفيذ 8 معاملات بجانب المعاملة الكنترول. ويمكن تلخيص النتائج الرئيسية فى النقاط التالية:-

- أعطت المعاملة T_4 (إضافة أرضية من البوراكس بمعدل 27 جم/ شجرة فى أول مارس + رش ورقى من البوراكس بمعدل 100 جزء فى المليون عند 70% من الإزهار الكامل) معنوياً أعلى نسبة مئوية لعقد الثمار ومحصول الشجرة (كجم) والكفاءة المحصولية (كجم/مساحة مقطع الساق سم^2) ووزن الثمار وطولها وعرضها ومحتوى الأوراق من الكلوروفيل الكلى تلتها المعاملة T_1 الأنتى ستريس 0.66% والمعاملة T_6 (رش ورقى من البوراكس بمعدل 100 جزء فى المليون عند 70% من الإزهار الكامل + رش ورقى من الكالسيوم المخلبى بمعدل "2.5 جم/لتر" ثم المعاملة T_3 (رش ورقى للبوراكس بمعدل 100 جزء فى المليون عند 70% من الإزهار الكامل) والمعاملة T_8 (الرش الورقى بالـ GA_3 بمعدل 20 جزء فى المليون عند 30%، 70% من الأزهار الكامل) والمعاملة T_2 (إضافة أرضية من البوراكس بمعدل 27 جم/شجرة) ثم المعاملة (T_7) (إضافة رش ورقى من الامكتون NAA بمعدل 100 جزء فى المليون عند 70% من الإزهار الكامل). بينما الأشجار الغير معاملة (الكنترول) أعطت أقل التأثيرات معنوياً فى كلا موسمى الدراسة.

- كل من المعاملتين T_5، T_6 أعطت معنوياً أعلى محتوى أوراق من الكالسيوم Ca% تلتها المعاملة T_4 ثم المعاملات (T_3، T_2، T_8، T_1، T_7) بينما أشجار المعاملة الكنترول أعطت أقل محتوى أوراق من الكالسيوم فى كلا موسمى الدراسة.
- المعاملة T_4 أعطت معنوياً أعلى محتوى أوراق من البورون تلتها المعاملات T_2 ثم T_1 ثم T_{56} ثم المعاملات (T_8، T_7، T_6، T_5) كمقارنة بالأشجار الغير معاملة (الكنترول) والتى أعطت أقل قيم فى موسمى الدراسة.