Journal of Horticultural Science & Ornamental Plants 5 (3): 238-246, 2013
ISSN 2079-2158
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DOI: 10.5829/idosi.jhsop.2013.5.3.1131

Improving Fruit Quality of Le-conte Pear Trees by Spraying Some Chemical Compounds

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Abstract: This study carried out during 2012 and 2013 seasons to study the effect of spraying 10, 20 or 30% methanol alone or mixed with either 1%urea or 1% glycine treatments on improving fruit quality of "Le-Conte "pear trees. Materials were applied on developing fruit stage (about 60 days after fruit set) and repeated after two weeks. Measurements included :vegetative growth, leaf area, leaf chemical content, fruit yield and quality, crop monetary value and cost treatments % (as compared to control treatment). Mentioned components, responded positively to the studied treatments. Spraying urea at 1% mixed with methanol 20% is recommended to improve productivity which increased grower income. Generally, this study achieved main target for fruit producers, high yield, quality and the lowest cost % which led to increased grower income.

Key words: Pear · Urea · Glycine · Methanol · Improve productivity · Fruit quality

INTRODUCTION

Pear is one of the most important fruits grown worldwide. In Egypt, the main cultivar is Le-Conte [1]. Cultivated area reached 20400 feddans that produced about 124800 tons with an average production of 6.12 tons/ feddan according to Ministry of Agricultural [2]. Many researchers have been attempted to increase productivity and quality of fruits.

Physiological role of urea have been clarified, hence transfer of nitrogen from leaves to bud and other parts of plant, which help to increase and promote phytohormones as cytokinins, gibberellins and IAA [3]. Alburqueque *et al.* [4] stated that spraying urea on orange trees significantly produced less fruit; and the yields were numerically less every year. The same others noticed that foliar urea application alone was more costly and less productive. The mobilization of nitrogen has been studied in the bearing shoots after foliar application of urea and found that the rapid translocation of nitrogen from younger leaves to other storage organs of the tree could explain the insensitivity of leaf analysis to detect excess nitrogen, since mature leaves from current-season shoots must be sampled to determine the nutritional status of tree. The failure of leaf analysis to detect excess nitrogen may be a result to nitrogen over-fertilization in orchards as being cleared by Choi*, et al.* [5] on persimmon, Fernandez-Escobar, *et al*. [6] on olive and Ouzounis and Lang [7] on cherry.

The effect of amino acid or Glycine was cited by Rai [8], Franco-Mora [9], Autar and Avtar [10], Yahia *et al*. [11], Abd-El-Messeih *et al.* [12] and Stino *et al*. [1] on pear. Rahim *et al.* [13] on apricot mentioned that as polyamines are implicated in cell division, metabolism and senescence processes, they can be applied to influence fruit development process. Also, they stated that application of various kinds of polyamines including putresin, spermin and spermidine could Influence fruit set, quality and senescence which is an important factor in the related trade and industry.

Methyl alcohol may be an alternate carbon source for plants. Exogenous application of methanol affected directly metabolic pathways related to plant growth and development (e.g. the content of amino acids). In addition, pathways related to plant defense mechanisms such as activation of genes involved in the jasmonic acid biosynthesis were affected. According to Zbiec *et al.* [14], Gout *et al*. [15], Dwivedi *et al.* [16] methanol-treated C3-plants had higher growth rates and consequently higher yields. Also, Nikolaos *et al.* [17] and Ramadan and

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Omran [18] in their study on grapevine indicated that application of methanol increasing the chlorophyll content, the leaf area and net productivity of vines. They added that there was a highly significant positive correlation between total yield, chlorophyll and carbohydrates content.

Generally, all methanol treatments (10, 30, 40 and 50 %) significantly increased length and diameter of shoots and inter node length at both application dates. It also increased total soluble solids (TSS), the TSS/acid ratio and total anthocyanins in berry skins but decreased total acidity [19].

This study investigates the effect of foliar application of methanol alone or on a combination with urea or glycine on the Le- Conte pear trees to improve the fruit quality and productivity of pear fruits.

MATERIALS AND METHODS

This investigation was carried out during two successive seasons 2012 and 2013 on "Le – Conte" pear trees, 10 years old and grafted on *pyrus communis* rootstock in El- khatattba village, El-Minufia Governorate. Thirty six trees uniform in vigor and representing the average size of trees were chosen to receive the treatments, planted at 4 x 6 m apart in sandy soil. The trees received the same horticultural practiced as usually done in this farm under drip irrigation system.

Trees were treated as follow:

- Control (tap water).
- Methanol alcohol at 10 % conc.
- Methanol alcohol at 20 % conc.
- Methanol alcohol at 30 % conc.
- Urea at 1% conc.
- Urea at 1% conc. & methanol alcohol at 10 % conc.
- Urea at 1% conc. & methanol alcohol at 20 % conc.
- Urea at 1% conc. & methanol alcohol at 30 % conc.
- Glycine at 1% conc.
- Glycine at 1% conc. & methanol alcohol at 10 % conc.
- Glycine at 1% conc. & methanol alcohol at 20 % conc.
- Glycine at 1%conc. & methanol alcohol at 30 % conc.

Treatments were arranged in a randomized complete block design; each treatment was represented by three replicated (one tree for each replicate). Treatments were applied on developing fruit stage (about 60 days after fruit set) and being repeated after two weeks. Response of the various measurable characteristics was recorded during two experimental seasons as follows: Vegetative growth:

On late August during both 1st & 2nd seasons (2012 & 2013), 20 developing shoots per tree were devoted for determining average shoot length and diameter(cm) and leaf area (cm^2) using Leaf Area meter model (1-203, CID, Inc, USA) on 10 mature leaves randomly collected from each replicate.

Leaf Chemical Content: Leaf chemical contents were determined in mid-August of both experimental seasons. Samples of 30 leaves /tree were taken at random from the previously vegetative spurs on tagged shoots of each tree. leaf samples were washed with tap water, oven dried at 70°C to a constant weight and grounded. The ground samples were digested with sulphoric acid and hydrogen peroxide according to Evenhuis and Dewaard [20]. Total nitrogen was determined calorimetrically according to Evenhuis [21] and Murphy and Riley [22] and the colorimetric method for total carbohydrates (%) as outlined by Dubois *et al.* [23]. Leaf chlorophyll reading was recorded using Minolta chlorophyll Meter SPAD-502 (Minolta camera. Co, LtD Japan) at the field [24]. Average of ten readings was taken from the middle of leaves from canopy tree.

Fruiting Measurements

Yield: During 2012 & 2013 seasons at harvest time, in mid-August of each season was study the total yield was estimated as weight of harvested mature fruits (Kg) per each individual tree.

Fruit Quality: At harvest time, in mid-August of each season twenty matured fruits from each tree under study were taken at random to determine fruit quality. In each sample, fruit weight (g) and fruit volume (cm^3); fruit dimensions (diameter & length (cm)) were determined. Also, fruit firmness was estimated by Magness and Taylor pressure tester which has a standard 5/16 of inch plunger and recorded as $Ib/inch^2$.

As for chemical properties; total soluble solids (TSS%) were determined by a hand refractometer. Fruit juice acidity (%) was determined (as malic acid) by titration with 0.1 normal sodium hydroxide with phenolphthalein as an indicator, according to A.O.A.C [25].

Crop Monetary Value (LE /Fed.): Fruit yield and weight were used for estimating crop monetary value considered a farm-gate price of 5&7 *LE*/Kg for the first class and 3.5&5 *LE*/Kg for the second one in the first and second season, respectively in the sand soil. As for percentage of treatments cost for control treatments, cost % had considered equal zero.

Data in this study were statistically analyzed according to the method of Snedecor and Cochran [26]. L.S.D at 5% level was used for means comparison of each treatment.

RESULTS AND DISCUSSION

Vegetative Growth

Shoot Length: Table (1) cleared a positive effect of spraying methanol, urea and glycine on shoot length of Le-Conte pear trees under investigative study in both seasons.

Presented data show that means values of methanol treatments gave the highest shoot length (114.58 & 148.84 cm) followed by urea1% (116.38 & 135.54 cm) and glycine 1% (112.57 & 124.47) compared by the control trees. It is clear that spraying methanol 30%conc. gave the tallest shoot (128.00 & 174.56 cm) compared by the control ones (116.67 & 141.18 cm). Referring to the interaction between methanol and urea, the best results were obtained when spraying methanol 10 % combined with urea 1% (122.50 & 148.84 cm). Whereas, methanol 20 % with Glycine 1% recorded the tallest shoot (135.50 & 147.45cm) comparing with all treatments in both seasons 2012 & 2013. Our data were agreement with, Yehia *et al*. [11], Abd-El-Messeih *et al*. [12] and Stino *et al*. [1] detected that amino acids or urea increased shoot length.

Shoot Diameter: Results in Table (1) pointed that shoot diameter was responded to the treatments under study in both seasons as shown. Data goes in the same line with shoot length. Generally, methanol recorded higher means values of diameter (0.99 & 1.14 cm) followed by urea 1% (0.96 & 1.08cm) and glycine1% (0.90 & 1.00cm) compared to untreated trees. Spraying methanol 20 % increased shoot diameter (1.01 & 1.24 cm) comparing with all treatments in the two seasons under study. On the other hand, the interaction between treatments show that urea 1% alone and glycine1% combined with methanol 20% gave diameter ranging about (1.01 & 1.09 cm and 1.00 & 1.12 cm) compared with untreated trees. But, spraying methanol 10% either alone or combined with urea 1% and glycine 1% gave the lowest diameter in both seasons under study. Obtained data are in a harmony with Abido [19], who mentioned that methanol treatments (10, 30, 40 and 50 %) significantly increased length and diameter of shoots. Abd-El-Messeih *et al.* [12] noticed that amino acids increased shoot diameter in pear trees.

Leaf Area: Data in Table (1) it clearly notices that there is a positive response to all treatments under study during seasons 2012 & 2013. Data indicated that the highest means values were recorded by spraying urea 1% alone (32.13 & 38.43 cm^2), followed by general methanol (26.73 & 32.59 cm^2) and Glycine 1% 27.62 & 31.33 cm^2) in both seasons, respectively. Moreover, methanol 20 % alone or Glycine 1% combined with methanol 20% increased leaf area (28.21 & 36.05 cm^2 and 25.30 & 30.26 cm^2) compared with control (27.00 & 29.59 cm^2) for the first and second season respectively.

It can be concluded that glycine 1% with methanol 20% was the best treatment to enhance in shoot length, shoot diameter and leaf area comparing with all treatments in the two seasons under study. In this respect, Ramadan and Omran [18] and Nikolaos *et al*. [17] on grapevine indicated that application of methanol had increased that chlorophyll content and the leaf area.

Leaf Chemical Content: Data presented in Table (2) shows the effect of spraying methanol, urea and glycine on chemical leaf content such as carbohydrates(C), nitrogen (N), C/N ratio and leaf chlorophyll content of Le- Conte pear leaves in both seasons under study.

Carbohydrates (C %): It is cleared that there are significant differences between leaves contents of carbohydrates and all treatments. Data in Table (2) spraying methanol 30%alone increased carbohydrates content in "le- Conte" leaves (35.80 & 37.67 %) followed by glycine 1% alone (35.50 & 36.50%) and urea 1% alone (33.33 & 35.53%) compare by untreated trees in the two seasons of study. Whereas, the interaction effect of methanol 10%combined with either urea1% or glycine1% increased the carbohydrates content (35.67 & 37.63 and 35.98 & 36.90%) in the two seasons under study, respectively.

Nitrogen (N %): Data in Table (2) showed that there is a significant effect were obtained from all treatments under study on leaf nitrogen content of Le-Conte pear leaves in 2012 & 2013 seasons. Herein, it is clear that methanol 10%

Table 1: Effect of spraying some chemicals compounds on shoot length (cm), shoot diameter (cm) and leaf area (cm^2) of "Le-Conte" Pear trees during 2012 and 2013 seasons

		Shoot length (cm)		Shoot diameter (cm)		Leaf area (cm^2)	
Treatments (A)	Methanol conc. (B)	1st season	2ndseason	1st season	2ndseason	1st season	2ndseason
Control	Without	116.67	141.18	0.97	1.06	27.00	29.59
	10 %	98.67	126.06	0.93	1.06	23.48	31.86
	20 %	115.00	153.54	1.01	1.24	28.21	36.05
	30 %	128.00	174.56	1.04	1.19	28.22	32.88
Mean (A)		114.58	148.84	0.99	1.14	26.73	32.59
Urea1%	Without	119.29	143.18	1.01	1.09	32.13	38.43
	10 %	122.50	148.52	0.92	1.10	28.10	34.26
	20 %	108.67	123.33	0.97	1.06	32.25	34.25
	30 %	115.05	127.11	0.94	1.06	29.29	33.09
Mean (A)		116.38	135.54	0.96	1.08	30.52	35.01
Glycine1%	Without	119.83	144.64	0.95	1.00	29.55	36.80
	10 %	84.41	78.44	0.82	0.88	23.63	24.84
	20 %	135.50	147.45	1.00	1.12	25.30	30.26
	30 %	110.54	127.37	0.83	0.99	31.98	33.43
Mean (A)		112.57	124.47	0.90	1.00	27.62	31.33
Mean (B)	Without	119.67	143.00	0.98	1.05	29.56	34.94
	10%	100.79	117.67	0.89	1.01	25.07	30.32
	20%	119.72	148.45	0.99	1.14	28.59	33.52
	30%	117.86	136.01	0.94	1.08	29.93	33.13
LSD (A) 0.05		7.21	8.22	0.03	0.04	1.94	2.00
LSD (B) 0.05		8.33	9.49	0.03	0.04	2.24	2.31
LSD (A x B) 0.05		14.43	16.45	0.06	0.08	3.87	4.00

Table 2: Effect of spraying some chemicals compounds on chemicals compounds of "Le-Conte" Pear trees during 2012 and 2013 seasons

		C (%)		N (%)		C/N ratio		Chlorophyll reading	
Treatments (A)	Methanol conc. (B)	1st season	2ndseason	1stseason	2ndseason	1stseason	2ndseason	1stseason	2ndseason
Control	Without	31.00	31.87	1.67	1.69	18.53	18.86	40.93	47.87
	10 %	34.20	36.53	2.13	2.16	16.06	16.89	45.30	46.77
	20 %	34.33	36.90	1.76	1.77	19.54	20.85	45.20	48.20
	30 %	35.80	37.67	1.92	1.92	18.78	19.62	47.13	49.23
Mean (A)		33.83	35.74	1.87	1.89	18.23	19.05	44.64	48.02
Urea1%	Without	33.33	35.53	1.98	2.04	16.82	17.34	48.60	50.73
	10 %	35.67	37.63	1.85	1.87	19.28	20.13	41.53	44.58
	20 %	32.50	33.30	2.10	2.11	15.47	16.78	44.07	50.03
	30 %	36.03	36.73	1.71	1.72	21.07	21.36	41.80	44.95
Mean (A)		34.38	35.80	1.91	1.94	18.16	18.90	44.00	47.58
Glycine1%	Without	35.50	36.50	1.93	1.95	18.43	18.72	45.10	46.25
	10 %	35.98	36.90	1.80	1.81	19.99	20.35	50.45	52.78
	20 %	33.98	34.62	2.05	2.08	16.55	16.65	40.67	45.13
	30 %	32.58	32.93	2.11	2.15	15.42	15.32	44.83	47.30
Mean (A)		34.51	35.24	1.97	2.00	17.60	17.76	45.26	47.87
Mean (B)	Without	33.28	34.63	1.86	1.89	17.93	18.31	46.33	48.28
	10%	35.28	37.02	1.93	1.95	18.44	19.12	44.31	48.04
	20%	33.61	34.94	1.97	1.99	17.19	18.09	43.31	48.13
	30%	34.81	35.78	1.92	1.93	18.42	18.76	44.59	46.82
LSD (A) 0.05		0.67	0.41	0.02	0.02	0.39	0.29	0.97	2.00
LSD (B) 0.05		0.77	0.48	0.02	0.037	0.46	0.33	1.12	2.31
LSD (A x B) 0.05		1.33	0.83	0.03	0.04	0.79	0.58	1.95	4.00

resulted in 2.13 & 2.16% of N leaf content, followed by urea1% (1.98 & 2.04 %) and glycine1% (1.93 & 1.95 %) in both seasons under study. For, the interaction between methanol with either urea 1% or glycine 1% show that methanol 30% combined with glycine 1% gave the highest values of nitrogen content in leaves (2.11 &2.15%) for the first and second season, respectively compared to all combined treatments and control.

C/N Ratio: Data in Table (2) revealed that the highest values of C/N ratio were recorded with methanol 20% (19.54 & 20.85) followed by glycine 1% (18.43 &18.72) and urea 1% (16.82 &17.34) compared to control (18.53 & 18.86) in the first and second season respectively. Whereas, the interaction between the experimental treatments had a significant effect on C/N ratio. Urea 1%with methanol 30% recorded the highest values (21.07 & 21.36) followed by glycine 1% with methanol 10% (19.99 & 20.35) in seasons 2011-2012 & 2012-2013, respectively. While the least values were recorded with Urea 1% with methanol 20% (15.47&16.78) and glycine1%with methanol 30% (15.42 &15.32)in the first and second seasons, respectively.

Chlorophyll Content: Concerning the effect of methanol, urea1% and glycine 1% effects on chlorophyll content, data in Table (2) showed that pronounced response was found with all treatments. With regard to the response of leaf chlorophyll content, it could be noticed that urea 1% gave the best result (48.60 & 50.73) followed by methanol30% (47.13 & 49.23) and glycine 1% (45.10 & 46.25) comparing to untreated trees in both seasons under study. Moreover, methanol 10%with glycine 1% increased leaf chlorophyll content reading (50.45&52.78) compared to all treatments in both seasons.

Fruiting Measurements

Yield (Kg): Data in Table (3) clear that tree yield was affected by methanol, urea and glycine treatments. In all treatments tree yield was increased comparing to control during both seasons of study. The obtained data revealed that spraying glycine recorded the highest means values of yield/tree (Kg) compare with untreated trees in both seasons, respectively. Whereas, spraying methanol 30% significantly increased the tree yield compared to control ones. Herein, the interaction between treatments reflected the effect of treatments on fruit tree yield. Treated trees by urea1% & methanol 20% resulted in 54.23 & 97.79Kg/tree followed by glycine1% & methanol 20% 75.21 & 85.48 Kg/tree compare with all treatments under control. Fayek *et al*. [27] found that the amino acids foliar sprays applied twice during bud burst and full bloom stages at one g/L on Le-Conte pear trees significantly increased the total yield per tree.

Physical Properties of Fruits

Fruit Weight: Table (3) revealed the effect of methanol, urea and glycine on "Le -Conte" fruits in 2012 and 2013 seasons under study. There was a significant increasing in the average of fruit weight in all treatments and that was due to the increments in fruit set and yield. Urea1% gave the highest means of fruit weight (177.92 & 206.63g) followed by glycine1% (168.83 & 192.67g) and methanol (149.03 &177.23 g) in both season under study. It was noticed that methanol at 20% conc. gave higher results either alone or combined with urea and glycine comparing to all treatments and control. Results in Table 4 indicated that there was an increase in fruit weight. Methanol 20% alone gave 157.84 &197.74 g and methanol 20 % with urea1% recorded 183.17 & 213.67 g. Whereas, the highest weight values were recorded with methanol 20% and glycine1% in both seasons under study (200.67& 219.5g). Our data are in the same trend with Bezold *et al*. [28], Yehia *et al*. [11] and Fayek [27] who cleared that the plant system are responsible for dividing tissues exert high levels of polyamines and activities of their bio synthetic enzymes, herein produced the highest fruit weight on their study on pear trees.

Fruit Volume: Table (3) indicated that the results of fruit volume are in a harmony with fruit weight or trend results. It is clearly noticed that best means values were obtained from spraying urea 1% (172.49&198.96cm^3) followed by general methanol (144.00 & 170.87cm^3) compared to the control. Whereas, the interaction between the treatments recorded that the highest volume which was obtained with glycine 1% and methanol 20% conc. (193.67 & 212.00 cm^3) follow by urea 1% and methanol 20% conc. (177.67 & 203.17cm^3) and methanol 20% alone (152.84&191.15 cm^3) comparing to all treatments and control in the two seasons of study. Stino *et al*. [1] found that foliar application of amino acids at 1000 ppm after fruit set and being repeated three times at 15 days intervals on Florida Prince" peaches significantly increased fruit size compared with control.

Fruit Diameter and Length: Fruit dimensions go in the same trend with fruit weight results; there is a positive increasing effect by treatments in both seasons under study. It may be due to the increment in fruit weight (Table 4). Stino *et al*. [1] mentioned that foliar application

Table 3: Effect of spraying some chemicals compounds on yield (Kg/ tree), fruit weight (g) and volume (cm^3) of Fruits of "Le-Conte" Pear trees during 2012 and 2013 seasons

		Yield (Kg /tree)		Fruit weight (g)		Fruit volume(cm^3)	
Treatments (A)	Methanol conc.(B)	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	Without	39.42	57.29	144.47	157.84	138.97	149.84
	10 %	41.67	60.79	142.00	161.83	137.67	154.33
	20 %	45.01	59.58	157.84	197.74	152.84	191.15
	30 %	50.78	81.30	151.80	191.50	146.55	188.17
Mean (A)		149.03	44.22	64.75	177.23	144.00	170.87
Urea 1%	Without	54.87	63.04	180.00	199.84	173.50	194.84
	10 %	49.51	84.02	176.00	207.67	170.50	200.00
	20 %	54.23	97.79	183.17	213.67	177.67	203.17
	30 %	43.47	75.42	172.50	205.33	168.28	197.83
Mean (A)		177.92	50.52	80.07	206.63	172.49	198.96
Glycine 1%	Without	35.87	69.11	146.00	166.17	141.67	159.67
	10 %	59.79	69.09	145.67	181.00	136.70	174.00
	20 %	75.21	85.48	200.67	219.50	193.67	212.00
	30 %	58.62	75.47	183.00	204.00	176.00	213.17
Mean (A)		57.37	87.29	168.83	192.67	162.01	189.71
Mean (B)	Without	51.36	68.60	156.82	174.61	151.38	168.11
	10%	42.35	75.89	154.56	183.50	148.29	176.11
	20%	58.15	87.57	180.56	205.44	174.72	199.33
	30%	50.96	77.40	169.10	205.13	163.61	202.49
LSD (A) 0.05		5.409	4.711	10.88	10.76	9.031	9.255
LSD (B) 0.05		6.246	5.440	12.56	12.43	10.43	10.69
LSD (A x B) 0.05		10.82	9.422	21.76	21.52	18.06	18.51

Table 4: Effect of spraying some chemicals compounds on fruit dimension and firmness of "Le-Conte" Pear trees during 2012 and 2013 seasons

		Fruit length (cm)		Fruit diameter (cm)		Fruit firmness ($lb/Inch^2$)	
Treatments (A)	Methanol conc.(B)	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	Without	8.20	8.80	6.67	7.10	12.06	13.70
	10 %	8.47	8.87	6.57	7.20	11.88	13.94
	20 %	8.77	9.40	6.70	7.20	11.26	13.70
	30 %	8.40	8.90	6.57	6.97	11.98	13.47
Mean (A)		8.46	8.99	6.63	7.12	11.79	13.70
Urea1%	Without	8.20	8.50	6.60	7.17	12.87	13.44
	10 %	8.60	9.27	7.17	7.77	12.03	13.27
	20 %	8.40	9.57	6.87	7.57	13.20	13.68
	30 %	8.00	9.30	6.67	7.37	12.44	13.52
Mean (A)		8.30	9.16	6.83	7.47	12.63	13.48
Glycine1%	Without	8.10	9.07	6.27	7.30	12.91	13.61
	10 %	7.80	8.70	6.80	7.20	12.60	13.64
	20 %	8.60	9.57	7.10	7.40	12.30	13.16
	30 %	8.40	8.60	7.07	7.30	11.19	13.39
Mean (A)		8.23	8.98	6.81	7.30	12.25	13.45
Mean (B)	Without	8.17	8.79	6.51	7.19	12.61	13.58
	10%	8.29	8.94	6.84	7.39	12.17	13.62
	20%	8.59	9.51	6.89	7.39	12.25	13.51
	30%	8.27	8.93	6.77	7.21	11.87	13.46
LSD (A) 0.05		0.14	0.11	0.21	0.13	0.55	0.22
LSD (B) 0.05		0.16	0.13	0.25	0.15	0.63	0.25
LSD (A x B) 0.05		0.28	0.23	0.43	0.25	1.09	0.43

Table 5: Effect of spraying some chemical compounds on chemical properties of "Le-Conte" Pear fruits during 2012 and 2013 seasons

		T.S.S (%)		Acidity (%)		T.S.S/acidity	
Treatments (A)	Methanol conc.(B)	1st season	2ndseason	1st season	2ndseason	1st season	2ndseason
Control	Without	13.10	13.57	0.22	0.23	59.55	59.88
	10 %	13.17	13.97	0.23	0.21	63.75	72.61
	20 %	12.97	13.62	0.21	0.24	70.08	56.74
	30 %	13.27	13.80	0.20	0.23	71.13	61.02
Mean (A)		13.13	13.74	0.22	0.23	66.13	62.56
Urea1%	Without	12.77	13.27	0.24	0.24	53.19	55.28
	10 %	13.20	14.02	0.21	0.23	62.33	61.00
	20 %	13.20	14.33	0.19	0.21	71.42	66.72
	30 %	13.17	13.90	0.20	0.26	67.57	53.69
Mean (A)		13.08	13.88	0.21	0.24	63.63	59.17
Glycine1%	Without	13.13	13.60	0.23	0.24	56.40	56.67
	10 %	13.24	13.24	0.21	0.23	62.54	58.87
	20 %	13.07	13.47	0.21	0.24	61.69	56.79
	30 %	13.17	13.83	0.23	0.24	58.00	58.48
Mean (A)		13.15	13.54	0.22	0.24	59.66	57.70
Mean (B)	Without	13.00	13.48	0.23	0.24	56.38	57.28
	10%	13.20	13.74	0.22	0.22	62.88	64.16
	20%	13.08	13.81	0.20	0.23	67.73	60.08
	30%	13.20	13.84	0.21	0.24	65.57	57.73
LSD (A) 0.05		0.13	0.16	0.02	0.03	8.47	6.55
LSD (B) 0.05		0.15	0.19	0.03	0.04	9.79	7.56
LSD (A x B) 0.05		0.26	0.33	0.05	0.06	16.95	13.09

Table 6: Effect of spraying some chemical compounds on treatments cost /Fed., Minotaur yield value LE /Fed, yield (fed./ton)and cost % of "Le-Conte" Pear trees during 2012 and 2013 seasons

		Treatments cost (€/fed)		Minotaur yield value (€/fed)		Yield (ton/fed.)		Cost (%)	
Treatments (A)	Methanol (B)	1stseason	2ndseason	1stseason	2ndseason	1stseason	2ndseason	1stseason	2ndseason
Control	Without	0.0 l	0.0 l	24.15 k	50.13 k	6.90 k	10.03 j	0.00 i	0.00 h
	10%	480.0 j	480.0 j	25.52 j	53.19 j	7.29 j	10.64 h	1.88 g	0.90 e
	20%	960.0 h	960.0 h	39.39 g	72.99 i	7.88 h	10.43 i	2.44 f	1.32 d
	30%	1440.0 e	1440.0 e	44.44 e	99.60 d	8.89 f	14.23 d	3.24 e	1.45 cd
Urea	Without	10.0 k	10.0 k	48.01 c	77.22 h	9.60 d	11.03 g	0.02 i	0.01 h
	10%	490.0 i	490.0 i	43.32 f	102.93 c	8.66 g	14.70 c	1.13 h	0.48 g
	20%	970.0 g	970.0 g	47.45 d	119.79 a	9.49 e	17.11 a	2.04 g	0.66 f
	30%	1450.0 d	1450.0 d	38.04 h	92.39 f	7.61 i	13.20 e	3.81 d	1.57 c
Glycine	Without	1200.0 f	1200.0 f	21.99 l	84.66 g	6.28 l	12.09 f	5.46 a	1.42 d
	10%	1680.0 c	1680.0 c	36.62 i	84.64 g	10.46 b	12.09 f	4.59 c	1.98 b
	20%	2160.0 b	2160.0 b	65.81 a	104.71 b	13.16 a	14.96 b	3.28 e	2.06 b
	30%	2640.0 a	2640.0 a	51.30 b	92.45 e	10.26 c	13.21 e	5.15 b	2.86 a

Means within each column followed by the same letter(s) are not significantly different at 5% level

of amino acids at 1000 ppm after fruit set and being repeated three times at 15 days intervals on Florida Prince" peaches significantly increased fruit diameter.

Fruit Firmness: Concerning of fruit firmness, it affected significantly by treatments in both season of study (Table 4). The results revealed that the highest means of firmness values were recorded by spraying urea 1% (12.63 & 13.48) followed by glycine 1% (12.25 & 13.45) and general methanol (11.79&13.70) in both seasons (2012&2013). Herein, the highest fruit firmness was recorded by urea1% & methanol 20% followed by glycine1% & methanol 20% in both seasons under study. Our data are in a harmony with Yehia *et al*. [11] and Stino *et al.* [1] who reported the same findings in this respect.

Fruit Chemical Properties: It is cleared that there are significant differences between the treatments and TSS% of Le- Conte pear fruits (Table 5). Methanol 30% alone or combined with glycine1% gave the highest TSS values followed by methanol 20% combined with urea1%.

Whereas, there were significant differences were recorded between all treatments and acidity (%) in both seasons under study. The lowest obtained values were recorded as a result of spraying urea 1% combined with methanol 20 % followed by methanol 30 % and glycine1% &methanol 20%. Abido [19] indicated that, methanol treatments (10, 30, 40 and 50%) at both application dates significantly increased total soluble solids (TSS) and the TSS/acid ratio in berry skins but decreased total acidity. In this respect Yehia *et al.* [11] and Stino *et al.* [1] on their studied on pear added that amino acids or urea increased TSS in fruits.

Crop Monetary Value (LE /Fed.): Table (6) illustrates the effect of some chemical compounds on average of treatments cost% and average value (LE/Fed.) during the two seasons of study (2012 and /2013). The mentioned components, positively responded to the studied treatments which can be arranged in the following succession : urea 1% & methanol 20 % > glycine1%& methanol 20 % > urea 1% & methanol 10 % > urea1% > methanol 30% > glycine 1% & methanol 10 % > urea1% & methanol 30 % > glycine1% & methanol 10 % > glycine1% & methanol 30 % > methanol 10 % > methanol 20 % > glycine 1% (*value of input control treatment is 0).

CONCLUSION

It could be concluded from the present study that spraying methanol (10,20,30%) alone or combination with urea 1% and glycine 1% improve vegetative growth, leaf chemical content, fruit quality and productivity of Le-Conte pear trees. Also, average of treatments cost % and average yield value LE/Fed. has positive effect with urea1% & methanol 20%, glycine 1% & methanol 20%,urea1% & methanol 10, urea1%, methanol 30% in comparison with control. While this average has negative effect with glycine 1% & methanol 10 %, urea 1% & methanol 30 %, glycine1% & methanol 10, glycine1% & methanol 30%, methanol 10, methanol 20, Glycine 1% treatments compared with control treatment. This study release the main target for fruit producers (high yield, fruit quality and the lowest cost %).

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