

Response of growth, yield and fruit quality of "le-conte" pear trees to some weed control METHODS

Kabeel, H.*; Fatma. I. I. Abou Grah*; S.M. Hussien* and **A. M. Fadlallah

*Hort. Res. Inst., **Weed Research Laboratory Central

Agric. Res. Center, Giza, Egypt

ABSTRACT

The present work was conducted at El-Kanater Horticultural Research Station during 2009 and 2010 seasons, to study the effect of some weed control treatments i.e., two mulching types (black polyethylene plastic and straw of rice), Roundup 48 % herbicide and hand hoeing on some vegetative growth, fruiting parameters, fruit quality, leaf nutrient status as well as dry weight measurement of annual and perennial weed of "Le-Conte" pear trees budded on (*P. communis* L.) rootstock.

Data obtained revealed that all investigated weed control treatments exhibited a positive effect on weed and a significant increase in all studied vegetative growth measurements i.e., shoot length increase and number of leaves per shoot. Moreover, all investigated fruiting parameters (fruit set %, tree yield either kg or No. of fruits, yield as ton/fed and yield increment % in relation to the control) were improved and significantly increased as a result of using the weed control treatments in comparison the control treatment. Furthermore, results indicated that fruit physical characteristics such as fruit weight, volume, firmness and fruit dimension as well as fruit chemical properties i.e., TSS %, acidity %, TSS/acid ratio and fruit sugar content were improved by the different weed control treatments in most cases as compared to the control treatment.

On the other hand, controlling weed species accompanied the pear trees reflected on the previous results by some weed control treatments. It could be arranged in descending order with regard to their significant effect on reducing the dry weight of weed species associated pear trees as follows: Roundup at 4 l/fed., soil covering with both black polyethylene plastic and straw of rice and hand hoeing twice.

In general, it could be concluded that, both mulching treatments either with black polyethylene plastic or straw of rice were the most effective for improving vegetative growth and fruit quality as well as increasing both fruit set and fruit yield of "Le-Conte" pear trees. In addition, the first mulching treatment was more effective than the second one.

INTRODUCTION

It is well known that "Le-Conte" pear trees is considered one of the most delectable and the major important cultivar deciduous fruit grown in Egypt along time ago. In fact, there was a tangible deterioration in pear orchard during the last two decades then, it brought out lower yield. Therefore, any

attempts aimed for increasing pear productivity and improving fruit quality from one hand and reducing both production costs and environmental pollution are the vital and important aims of researchers.

Weed control is one of the most important cultural practices that has not been given much attention in most fruit trees in Egypt. Weeds are serious competitions with fruit trees for soil moisture and nutrients (**Sharma and Bhutani, 1989**). Therefore, a great attention is focused on the different soil management system on weed control in pear orchard. Soil mulching as agricultural practice play an important role by conserving soil moisture (**Khalifa, 1994**), reducing soil erosion, improving soil structure, regulate soil temperature and controlling the weed population (**Rao and Pathak, 1998**). Also, mulching improving vegetative growth and distribution of roots and their absorption of nutrients (**Verma et al., 2005**). Thus, several researchers were done in this respect by many investigators **Helail (1993) and Said (1993)** on pear trees; **Neilsen et al., (1986), Thakur et al., (1993 & 1997), Zayan et al., (1994), Fatma, Abou-Grah (1999), Pande et al., (2005), Singh et al., (2005), Mikhael (2007) and Mikhael and Mady (2007)** on apple trees; **Hifny et al., (1994) and Zeerban (2004)** on grapevines; **El-Kassas et al., (1993); Khalifa (1994)** on citrus trees and **Chattobadhaya and Patra (1997)** on pomegranate.

The present investigation was planned and carried out to throw some lights and evaluate the possible effects of the different methods of controlling weeds i.e., hand hoeing, two mulching material sources and herbicide treatment, beside bare soil as the control (untreated trees) on some vegetative growth measurements, some fruiting parameters and fruit quality of "Le-Conte" pear trees as well as dry weights measurement of narrow and broad leaves of weeds.

MATERIALS AND METHODS

The present investigation has been carried out at El-Kanater Horticultural Research Station, Kalyubia Governorate, Egypt. The experiment has been extended for two consecutive of 2009 and 2010 seasons on fruitful trees of "Le-Conte" pear cultivar.

The selected trees were about 23-years-old, budded on "*Pyrus communis* L.) rootstock, grown in clay loamy soil and planted at 5 meters space in a square system. Trees were carefully selected as being healthy and approximately uniform in their vigour, shape and size and received regularly the same horticultural practices usually done in this region.

The different investigated weed control treatments in this study were:

- 1- No cultivated trees or unweeded (control).
- 2- Hand hoeing twice: it was practiced two times during each season at 45 days intervals after winter hoeing, the first hoeing on 1st week of April and the second on 3rd week of May).
- 3- Two mulching types on the soil were:-

- a- Black polyethylene plastic, used to cover all the soil surface completely under trees. The polyethylene plastic sheet was 80 micron wide and 20 mm thick. The mulch was applied on the 1st week of April on the soil up to the end of the July during both seasons.
- b- Straw of rice mulch 30 cm thick, was spread out on the soil surface to cover the soil completely of the some time of plastic sheets treatment.
- 4- Roundup 48 % herbicide: (N-phosphonomethyle Glycine) common name as glyphosate was used and sprayed according to the recommended rate (4 L/fed.) at one time on April in both seasons.

Table (1): The dominant weeds species in the experiment during 2009 and 2010 seasons.

Annual weeds	Perennial weeds
<i>Echinochloa colonum</i> L.	<i>Cynodon dactylon</i> L.
<i>Portulaca oleracea</i> L.	<i>Cyperus rotundus</i> L.
<i>Xanthium spinosum</i> L.	<i>Convolvulus arvensis</i> L.
<i>Bidens bipinnata</i> L.	-----

The complete randomized block design was used. Each treatment was replicated three times and every replicate was represented by a single tree. On each tree four main (scaffold) branches well distributed around the periphery (one branch on each direction) were tagged and the following parameters were determined.

1- Weeds survey (dry weight of annual, perennial and total weeds):

Weeds were taken from one square meter of each plot at 60 and 120 days after treatments. Weeds were classified into two groups i.e., grasses and broad leaf weeds, the dry weight of each class were determined in grams/m².

2- Some vegetative measurements:

Four main branches nearly similar in diameter were chosen around the tree and tagged to measure the length of new shoots which developed on these branches. This measurement was conducted on the first week of April and repeated on mid-August when growth ceased then, shoot length increase was estimated as follows:

$$\text{Shoot length increase} = \text{shoot length on mid August} - \text{shoot length in April.}$$

Meanwhile, number of leaves/shoot was conducted on mid August in both seasons.

3- Fruiting parameters:

3-a. Fruit set percentage:

Number of flowers and set fruitlets on the tagged branches were counted and recorded in all treatments, fruit set percentage was estimated by the following equation according to **Westwood (1978)**.

$$\text{Fruit set (\%)} = \frac{\text{Number of set fruitlets}}{\text{Total number of flowers}} \times 100$$

3-b.- Tree yield (kg or number of fruits/tree and ton/feddan) and yield increment % in relation to the control:

The average yield as kg/tree, number of fruits per tree and ton/feddan for each treatment was recorded at the picking time. Furthermore, yield increment percentage in comparison the control for each treatment was calculated by the following equation according to **Kabeel (1998)**.

$$\text{Yield inc. \%} = \frac{\text{Yield/treatment} - \text{yield/control}}{\text{Yield / control}} \times 100$$

4- Fruit quality

Samples of ten fruits from each replicate were collected at harvesting time and the following characters were determined as follows:

4-a. Fruit physical characteristics: including fruit weight (gm.), fruit volume (ml³), fruit dimensions (fruit height and diameter in cm), fruit shape index (fruit height/fruit diameter ratio) and fruit firmness (lb/inch²) was measured by using **Magness and Tayler** pressure tester with 7/18 inch plinger (1925).

4-b. Fruit chemical characteristics:

* Total soluble solids (TSS %)

Handy refractometer was used to determined the TSS % in fruit Juice according **A.O.A.C. (1985)**.

* Total titratable acidity (%):

Fruit Juice total acidity % as malic acid (mgs/100 gms fruit juice) according to **Vogal (1968)** and **A.O.A.C. (1985)**.

* TSS/acid ratio:

TSS/acid ratio was estimated by dividing the total soluble solids % over total acidity %.

* Total sugars content:

Fruit content of total sugars in the pulp of fruit fresh was determined coloremeterically according to **Dubaist et al., (1956)**.

- Statistical analysis:

All the obtained data during the two seasons of the study were subjected to analysis of variance method according to **Snedecor and Cochran (1980)**. Meanwhile, differences among means were compared using Duncan's multiple range test at 5 % level (**Duncan, 1955**).

RESULTS AND DISCUSSION

1- Weeds survey (dry weight of annual, perennial and total weeds):

As shown from Table (2), Roundup at 4 L/fed. and black plastic sheet gave the highest reduction percentage in dry weight of the three weed categories (annual, perennial and total together). The reduction percentage by two the pervious respect treatments on the dry weight of total weeds were reached to 95.8 & 95.0 % in 1st survey; 90.3 & 88.3 5 in 2nd survey; 86.8 & 85.2 % in 3rd survey and 74.8 & 74.0 % in 4th survey compared with the control in the first season. Meanwhile, in the second season, their reduction percentage were reached to 95.8 & 95.1 %; 90.1 & 89.1; 87.1 & 85.8 and 75.7 & 74.8 % in the fourth surveys, respectively. Straw of rice and hand hoeing twice treatments gave the following significant reduction percentage in the dry weight of the total weeds by 91.3 & 74.5 %; 85.8 & 75.3 %; 78.2 & 70.7 % and 63.9 & 55.0 % in the fourth surveys, respectively compared to the control treatment, in first season. Meanwhile, in the second season, the respective reduction percentages by the previous two treatments were 91.5 & 75.1 %; 86.0 & 75.4 %; 79.6 & 71.7 % and 64.6 & 55.7 %, in the fourth surveys, respectively.

Table (2): Effect of weed control methods on dry weight of annual, perennial and total weeds/m² of "Le-Conte" pear trees during 2009 and 2010 seasons.

Treatments	Dry weight (gm.)											
	Annual weeds				Perennial weeds				Total			
	1st survey	2nd survey	3rd survey	4th survey	1st survey	2nd survey	3rd survey	4th survey	1st survey	2nd survey	3rd survey	4th survey
2009 season												
Control (unweeded trees)	50.6A	87.73A	112.5A	175.0A	29.88A	60.03A	61.84A	124.2A	80.48A	147.76A	174.34A	299.20A
Hand hoeing twice	14.07B	21.37B	33.57B	76.8B	6.48B	15.13B	17.47B	58.0B	20.55B	36.50B	51.04B	134.80B
Black polyethylene plastic	2.48D	9.23D	17.9D	44.33D	1.61C	7.27C	7.90C	33.50D	4.09C	16.50D	25.80D	77.83D
Straw of rice	4.26C	13.63C	28.5C	62.87C	2.72C	7.87C	9.47C	45.17C	6.98C	21.050C	37.97C	108.04C
Roundup 48 % at 4 L/fed	2.04D	8.40D	16.1D	43.13D	1.32C	5.95C	6.86C	32.23D	3.36C	14.35D	22.96D	75.36D
2010 season												
Control (unweeded trees)	50.97A	89.4A	111.20A	169.3A	28.97A	59.23A	60.1A	116.9A	79.94A	148.63A	171.30A	286.20A
Hand hoeing twice	13.60B	20.87B	32.83B	71.4B	6.33B	14.77B	15.6B	55.47B	19.93B	36.64B	48.43B	126.87B
Black polyethylene plastic	2.37D	9.13D	16.67D	40.87D	1.58C	7.14C	7.63C	31.2D	3.95C	16.27D	24.30D	72.07D
Straw of rice	4.13C	13.07C	25.83C	59.20C	2.67C	7.68C	9.07C	42.17C	6.80C	20.75C	34.90C	101.37C
Roundup 48 % at 4 L/fed	1.95E	8.15D	15.63D	40.27D	1.44C	5.85C	6.5C	29.2E	3.39C	14.00D	22.13D	69.47D

Approximately, the previous results were observed on reducing the dry weight of the total observed weeds gave the same trend on the annual and perennial weeds which their sum together was the total weeds.

It is noticed that the previous results compared to the untreated control. The infestation rates of the total weeds in the control were 80.5, 147.8, 174.3 and 299.2 g/m² in the fourth surveys in the first season, respectively; and were 79.39, 148.6, 171.3 and 286.2 g/ m² in fourth surveys in the second season, respectively.

Generally, the abovementioned results indicated that both herbicide (spraying with Roundup) and mulching with black polyethylene plastic treatments were more effective treatments in weed control treatments were used in this study. These results were supported by the findings of several investigators, **Helail (1993)**, **Fatma- Abou-Grah (1999)**, **Said et al., (1993)**, **Mekhael and Maddy (2007)** on pear and apple orchards. Also **Javkovic (1986)** showed that Roundup at 10 L/ha, gave the best control of the most dominant weed.

2- Vegetative growth measurements:

It is observed clearly from data represented in Table (3) that, shoot length increase (cm) parameter gave typically the same trend in the two seasons. However, the highest value and the longest shoots were significantly in concomitant with covering by black polyethylene plastic. Moreover, the opposite trend was found with those untreated pear trees (control treatment) which exhibited the least value and the shortest shoots. On the other hand, the other weed control treatments came in between with relatively variable tendency of response. Furthermore, the differences in shoot length increase parameter were significant as the five weed control treatments were compared each other during the first and second seasons.

Considering the response of number of leaves per shoot to the abovementioned weed control treatments, data in the same Table revealed obviously that, the highest number of leaves/shoot was in closed relationship with covering the soil with black polyethylene plastic and straw of rice with no significant differences between them; while the opposite trend was noticed with the control treatment. On the other hand, the response of the number of leaves per shoot to both hand hoeing and spraying with Roundup herbicide treatments ranked statistically in between the aforesaid discussed two extents. This trend was true during both 2009 and 2010 seasons.

The positive effects of soil mulching treatments in improving shoot and leaf growth of "Le-Conte" pear trees might be due to its effects on soil temperature and moisture content which enhanced root growth and increased nutrients uptake via the roots. Similar results were obtained by **Helail (1993)** on pear; **Fatma-Abou Garah (1999)**, **Zayan et al., (1994)**, **Pande et al., (2005)** and **Mikhael (2007)** on apple trees; **Hifny et al., (1994)** and **Zeerban (2004)** on grapevine.

Table (3): Effect of different weed control treatments on some vegetative growth measurements of "Le-Conte" pear trees during 2009 and 2010 seasons.

Treatments	Shoot length (cm)		Number of leaves/shoot	
	2009	2010	2009	2010
Control (unweeded trees)	31.00E	33.33E	14.33C	15.00C
Hand hoeing (twice)	55.33C	59.67C	21.00B	20.67B
Black polyethylene plastic	90.0A	94.00A	28.67A	28.03A
Straw of rice	66.0B	70.33B	27.17A	27.83A
Roundup 48 % at 4 L/fed.	45.00D	48.00D	16.00C	14.67C

3- Fruiting parameters:

3.a- Fruit set percentage:

Concerning the response of the effect of some weed control treatments i.e., hand hoeing, herbicide and both soil covering with black polyethylene plastic and straw of rice on the percentage of fruit set of "Le-Conte" pear trees, it was clear from data represented in Table (4) that fruit set % responded significantly. However, it was generally increased with using all investigated weed control treatments as compared to untreated trees (control) during both the first and second seasons of study. The increase exhibited in fruit set % in this respect was significant. On the other hand, the differences were more pronounced as the "Le-Conte" pear trees were treated with soil covering treatments with both black polyethylene plastic and straw rice. In other words, the last two treatments abovementioned induced statistically the highest values in their fruit set percentage as compared to any weed control treatments during both 2009 and 2010 seasons of study.

3.b- Tree yield measurements:

* Yield measurements (number of fruits/tree and either kg/tree or ton/fed.):

With respect to the effect of some weed control treatments on yield parameters of "Le-Conte" pear trees, data obtained during both the 1st and 2nd seasons of the study and tabulated in Table (4) and displayed obviously that, covering the soil with both black polyethylene plastic and straw of rice treatments had significantly the highest values of all abovementioned yield measurements i.e., number of fruits/tree, kg/tree and ton/fed. On the other hand, the least values of "Le-Conte" pear trees cropping measurements were statistically exhibited and always in concomitant to those untreated pear trees (control). In addition, the other two treatments were in between as compared to as the aforesaid two extents. Such trend was detected during both 2009 and 2010 seasons.

* Yield increment % in relation to the control:

Regarding the yield increment % in relation to the control, data in the same Table indicate clearly that, the response typically followed the same trend previously detected with average yield either number of fruits or kg per tree and yield as ton/fed. during both 2009 and 2010 seasons. However, both

treatments black polyethylene plastic sheet and straw of rice resulted in statistically the highest values of yield increment % over the control. Whereas, both hand hoeing and Roundup herbicide treatments were significantly the inferior as exhibited the least value of yield increment % in relation to the control. Such trend was true during the first and second seasons of experimental work.

The beneficial effects of weed control treatments under study especially soil mulching could be attributed to its effect on soil temperature and keeping soil moisture content which affected the availability of nutrients associated with mulches resulted in higher yield. These findings are in a complete agreement with those obtained by Helail (1993), Zayan *et al.*, (1994), Fatma, Abou-Grah (1999), Pande *et al.*, (2005), Singh *et al.*, (2005), Verma *et al.*, (2005), Mikhael (2007) and Mikhael and Mady (2007) on some fruit deciduous trees who found that, soil mulches and other weed control treatments improved fruit set and productivity of tree.

Table (4): Response of some fruiting parameters to the different weed control treatments of "Le-Conte" pear trees during 2009 and 2010 seasons.

Treatments	Fruit set %		Number of fruits/tree		Yield /tree (kg.)		Yield ton/fed.		Yield increment %	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Control (unweeded trees)	4.67C	3.93C	390.0C	393.0D	47.98C	49.29C	8.28C	8.06C	0.00D	0.00D
Hand hoeing twice	5.50AB	4.13B	414.3AB	415.0BC	59.73B	61.61B	10.35B	10.03B	24.65B	25.13B
Black polyethylene plastic	5.54A	4.30A	430.0A	436.7A	69.60A	70.83A	11.90A	11.69A	45.29A	43.82A
Straw of rice	5.50AB	4.25AB	428.0A	430.0AB	68.13A	68.92A	11.58A	11.45A	42.16A	40.03A
Roundup 48 % at 4 L/fed	5.25B	4.13B	408.3B	410.0C	55.50BC	55.96B	9.40B	9.33B	16.06C	13.36C

4- Fruit quality

4.a- Fruit physical properties.

* Fruit weight and fruit volume.

With respect to the effect of the various investigated weed control treatments under study on fruit weight, data in Table (5) indicated clearly that, the average fruit weight (gm.) was responded significantly to the effect of all weed control treatments as compared to the control treatment (untreated trees). Furthermore, weed control treatments of covering soil with both black polyethylene plastic and straw of rice induced fruits had significantly the heaviest weight. Contrary to that, "Le-Conte" pear trees subjected to the control treatment (unweeded trees) was the inferior whereas, they resulted in inducing statistically the lightest fruits. In addition to that, other weed control treatments were intermediate as compared to the aforesaid two extents. Such trend was true during both the first and second seasons of the experimental work.

Considering the response of fruit volume of "Le-Conte" pear fruit to the influence of various weed control treatments in this study, data in the same

Table revealed obviously that, the response typically followed the same trend previously detected with the average fruit weight during the two seasons. The biggest "Le-Conte" fruits were statistically in closed relationship with trees subjected to the both weed control treatments of black polyethylene plastic and straw of rice. Meanwhile, the smallest ones were always in concomitant to the control treatment. Moreover, the other weed control treatments came in between with tendency of variability in their effectiveness. Such trend was true throughout both 2009 and 2010 seasons.

*** Fruit firmness:**

Concerning the effect of different weed control treatments used in this study on fruit flesh texture of "Le-Conte" pear, data in Table (5) showed obviously that, the greatest values of fruit firmness were statistically in closed relationship with those pear trees treated with black polyethylene plastic treatment which exhibited fruits had significantly the firmest flesh texture. This trend was detected during both 2009 and 2010 seasons. On the other hand, the opposite trend was observed with both of hand hoeing and Roundup herbicide which resulted in the least significantly value and inducing fruits having softness flesh texture during both the first and second seasons, respectively.

*** Fruit height and diameter:**

As for the effect of different investigated weed control treatments under study on both fruit height and fruit diameter of "Le-Conte" pear trees, data tabulated in Table (5) pointed out that, covering soil with black polyethylene plastic exhibited statistically the greatest fruit height and the widest diameter. Meanwhile, the reverse trend was observed with the control treatment (unweeded trees) which resulted in the least significant value in this concern. On the other hand, the other weed control treatments were in between the abovementioned two extents. However, it could be noticed that, the differences in most cases were so little to reach level of significance and could be safely neglected especially with the fruit height in the second seasons of study.

Table (5): Influence of different weed control treatments on some fruit physical characteristics of "Le-Conte" pear trees during 2009 and 2010 seasons.

Treatments	Fruit weight (gm.)		Fruit volume (cm ³)		Fruit firmness (lb/inch ²)		Fruit length (cm.)		Fruit diameter (cm.)	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Control (unweeded trees)	123.0C	125.4D	123.3C	126.7D	17.07B	14.93B	6.44C	7.69A	5.73C	6.13B
Hand hoeing twice	144.2B	148.8B	145.0B	150.0B	14.70C	14.67B	7.25AB	7.82A	6.04B	6.29AB
Black polyethylene plastic	161.7A	162.3A	163.3A	166.7A	19.53A	17.77A	7.60A	7.93A	6.34A	6.56A
Straw of rice	159.1A	160.3A	160.0A	161.7A	17.07B	14.23BC	7.26AB	7.80A	6.15AB	6.34AB
Roundup 48 % at 4 L/fed	135.8B	136.8C	138.3B	138.3C	17.87AB	12.57C	7.18B	7.81A	5.99BC	6.23B

4.b- Fruit chemical characteristics:*** Fruit Juice total soluble solids (TSS %)**

Data represented in Table (6) revealed obviously that, fruit juice total soluble solids content responded significantly to the effect of the different weed control treatments as compared to the unweeded trees (control) especially in the first season. However, treated trees with covering the soil with black polyethylene plastic followed by straw of rice and hand hoeing treatments without no significant between them, induced fruits with the highest percentage of total soluble solids. Contrary to that, the opposite trend was observed with the control treatment (unweeded trees) which exhibited the poorest fruits in their juice total soluble solids content. Meanwhile, Roundup treatments gave the lowest significant increasing value during both 2009 and 2010 seasons.

*** Fruit Juice total acidity %:**

Considering the effect of the investigated weed control treatments under study on the juice total acidity, it is quite evident from data in the same Table that, the opposite trend to that previously discussed with fruit juice TSS % was detected approximately during the first season. However, the highest value of total acidity % was in closed relationship to the control treatment, meanwhile both soil covering with black polyethylene plastic and straw of rice weed control treatments induced fruits had significantly the least values of juice acidity % without no significant differences between them. In addition to that, the remained two treatments exerted statistically on intermediate value as compared to the abovementioned two extremes. Such trend was true in the first season only.

Furthermore, data obtained in the second season (2010) revealed that, variation due to the effect of the different weed control treatments on fruit juice total acidity % were so little and could be safely neglected, since the differences were so little to reach level of significance. The absent of significance in the response of fruit acidity content to the all investigated weed control treatments including unweeded treatment (control) as detected clearly during the second season of study.

*** TSS/acid ratio:**

Tabulated data in Table (6) indicated obviously that, fruit juice TSS/acid ratio was positively responded to all investigated weed control treatments as compared to the control treatment (unweeded trees). Whereas, all tested weed control treatments significantly increased TSS/acid ratio in comparison to the control which exhibited the least statistically value of TSS/acid ratio during both 2009 and 2010 seasons of study. Moreover, both of weed control treatments of black polyethylene and straw of rice treatments resulted in the greatest values of TSS/acid ratio in fruit. On the other hand, other two weed control treatments were intermediate as compared to the abovementioned two extents. Such trend was detected during both the first and second seasons of the experimental study.

*** Fruit sugar content:**

Data represented in Table (6) showed obviously that, fruit sugars content was responded to all used weed control treatments as compared to the unweeded treatment in the two seasons of study. Whereas, black polyethylene plastic followed by straw of rice were significantly the superior treatments as exhibited the greatest values of fruit sugar content during both 2009 and 2010 seasons. On the contrary, unweeded trees (control treatment) was statistically the inferior, and induced the least value in this respect. Moreover, the other two treatments i.e., hand hoeing (clean cultivation) and herbicide treatments were intermediate the abovementioned two extremes. Such trend was true during both the first and second seasons.

The positive effect of most investigated weed control treatments under study especially soil mulching treatments in improving most fruit physical and chemical characteristics could be attributed to ideal soil moisture content and supply of balanced nutrition (Varma *et al.*, 2005). These results are in harmony with those observation and obtained by Helail (1993) and Said *et al.*, (1993) on pear trees; Hinfy *et al.*, (1994) on grapevine; Zayan *et al.*, (1994), Fatma Abou, Grah (1999), Pande *et al.*, (2005), Singh *et al.*, (2005), Mikhael (2007) and Mikhael and Maddy (2007) on apple trees.

Table (6): Effect of the different weed control treatments on some fruit chemical properties of "Le-Conte" pear trees during 2009 and 2010 seasons.

Treatments	TSS (%)		Acidity (%)		TSS/acid ratio		Sugars (%)	
	2009	2010	2009	2010	2009	2010	2009	2010
Control (unweeded trees)	13.00D	12.50C	0.453A	0.430A	32.63D	29.07D	52.67D	51.33C
Hand hoeing twice	15.00B	12.67B	0.367C	0.423A	36.33B	29.96BC	57.33C	56.00B
Black polyethylene plastic	15.50A	13.17A	0.383C	0.427A	39.23A	30.91A	60.67A	60.33A
Straw of rice	15.00B	13.17A	0.413B	0.430A	36.33AB	30.62AB	59.33AB	60.33A
Roundup 48 % at 4 L/fed	14.00C	12.67B	0.430B	0.430A	34.18C	29.46CD	55.00C	55.33B

REFERENCES

- Association Of Official Agricultural Chemists (A.O.A.G) (1985).** "Official Methods Of Analysis" Benjamin Franklin Station, Washington, D.C., U.S.A."; 495-510.
- Chattopadhyaya, P. K. and S. C. Patra (1997).** Effect of mulches on soil moisture and temperature in pomegranate. Indian J. Hort. 54 (4): 280-282.
- El-Kassas, S. E.; Ahmed, K. L.; El-Sonbaty, M. R. and Badawy, M. (1993).** The effect of weed control on flowering and fruit setting of Manfalouty pomegranate trees. Assiut Jour. Agric. Sci., 24 (2): 111-118.

- Dubaist, M.; Gilles, K.; Hamilton, J. K.; Rebers P. A. and Smith, F. (1956).** A colorimetric method for the determination of sugars and related substances. *Anal. Chem.* 28: p.350
- Duncan, D.B. (1955).** Multiple range and multiple F. tests. *Biometrics*, 11: 1-42.
- Fatma, I. I. Abou-Garah (1999).** The effect of some cultural treatments on growth and fruiting of bearing "Anna" apple trees. M.Sc. Thesis, Fac. of Agric., Moshtohor, Zagazig Univ.
- Hifny, H. A., G. A. Baghdaday and M. S. Arafa (1994).** Response of growth and yield of "Banaty" grapevine to soil mulches as a tool for weed control. *Egypt. J. Hort.*, 21 (1): 81-92.
- Helail, B. M. (1993).** A comparative studies on some weed control treatments in "Le-Conte" pear orchard. *Minia Jour. Agric. Res. and Development*, 15: 571-585.
- Javkovic, R. (1986).** Efficacy of some herbicides for weed control in peaches. *Jugo Slovensko Vocarstvo* 20 (77-78): 135-139.
- Kabeel, H. (1998).** Effect of some growth regulators on fruit set, yield and fruit quality of "Costata" persimmon trees. *Minufiya, Jour. Agric. Res.*, 24 (5): 1727-1739.
- Khalifa, M. R. (1994).** Effect of different types of mulching on water consumptive use of "Valencia" orange trees. *J. Agric. Res. Tanta Univ.*, 20 (3): 591-602.
- Magness, J. R. and G. F. Taylor (1925).** An improved type of pressure tester for the determination of fruit maturity. *U.S. Dept. Agric. Circ.*, 350 8p.
- Mikhael, G. B. (2007).** Effect of some drip irrigation and mulching treatments on 1- Vegetative growth and nutritional status of "Anna" apple trees growing new reclaimed soils. *Minufiya, Jour. Agric. Res.*, 32 (4): 1155-1174.
- Mikhael, G. B., and A.A. Maddy (2007).** Effect of some drip irrigation and mulching treatments on 2- Yield, fruit quality and water use efficiency of "Anna" apple trees growing new reclaimed soils. *Minufiya, Jour. Agric. Res.*, 32 (4): 1175-1191.
- Neilsen, G. H.; E. J. Hogue and B. G. Drought (1986).** Orchard soil management on soil temperature and apple trees. *Canadian J. Soi Sci.*, 66: 701-711.
- Pande, K. K.; D. C. Dimri and P. Kamboj (2005).** Effect of various mulches on growth, yield and quality attributes of apple. *Indian J. Hort.*, 62 (2): 145-157.
- Rao, V. K. and R. K. Pathak (1998).** Effect of mulches on a onla (*Embllica officinallis*) orchard in sodic soil. *Indian J. Hort.*, 55 (1): 27-32.
- Said, I. A.; H. Mokhtar and A. A. Salim (1993).** Comparison studies on weed control methods in pear trees. *J. Agric. Sci., Mansoura Univ.*, 18 (1): 257-265.
- Sharma, Y. P. and Bhutani, V. P. (1989).** Effect of nitrogen levels and weed control treatments on nutrient status of peach. *Hort. Abst.*, 61 (9): 7745.

- Singh, S. R.; A. K. Sharma and K. K. Srivastava (2005).** Response of mulches and antitranspiration on moisture conservation, yield and quality of apple (*Malus domestica*, Borkh) cv. Red Delicious under rain fed conditions of Kashmir valley. Environment and Ecology. 23 (3): 572-576.
- Snedecor, G. W. and G. W. Cochran (1990).** Statistical Methods. 7th ed The Iowa State Univ., press Ames, Iowa. U.S.A. p.593.
- Thakur, G. C.; Chadha, T. R.; Verma, H. S. and Kumar, J. (1993).** Effect of soil management systems on bearing and fruit quality of apple cv. Red Delicious. Indian Jour. Hort., 50 (1): 110-131.
- Thakur, G. C.; Chadha, T. R.; Verma, H. S. and Kumar, J. (1997).** Effect of clean cultivation, mulching and sod culture on mineral nutrition and root growth of apple cv. Red Delicious. Indian Jour. Hort., 54 (10): 53-57.
- Verma, M. L.; S. P. Bhardwaj; B. C. Thakur and A. R. Bhandria (2005).** Nutritional and mulching studies in apple. Indian J, Hort. 62 (4): 332-335.
- Vogel, A. (1968).** A Text Book of Quantitative Inorganic Analysis. Longmans, New York, pp. 1216.
- Westwood, M. N. (1978).** Temperate Zone Pomology W. H. Freeman and Company. San Francisco.
- Zayan, M. A., S. M. Zeerban, E. Morsey and G. B. Mikhael (1994).** Effect of some soil mulching on vegetative growth, yield, fruit quality and leaf mineral contents of "Anna" apple trees grown in calcareous soil. J. of Agric. Res. Tanta Univ., 20 (4): 721-730.
- Zeerban, S. M. (2004).** Vegetative growth, yield and fruit quality of Thompson seedless grapevines as affected by some soil mulching materials. J. Agric. Sci. Mansoura Univ., 29 (6): 3515-3529.

استجابة النمو والمحصول وجودة الثمار لأشجار الكمثرى (صنف ليكونت) لبعض

طرق مكافحة الحشائش

حسين قابيل إبراهيم* فاطمة إبراهيم إبراهيم أبو جرة* شعبان محمد حسين*

**أشرف محمد فضل الله

معهد بحوث البساتين* المعمل المركزى لبحوث الحشائش**

مركز البحوث الزراعية، الجيزة مصر.

أجريت هذه الدراسة بالمزرعة البحثية بمحطة بحوث البساتين بالقناطر الخيرية خلال موسمي الدراسة 2009، 2010 بهدف دراسة تأثير الطرق المختلفة لمكافحة الحشائش المصاحبة لأشجار الكمثرى على بعض قياسات النمو الخضري وقياسات العقد والإثمار وكذلك صفات جودة الثمار الطبيعية والكيميائية لأشجار الكمثرى المطعومة على أصل الكميونس وكانت المعاملات على النحو التالي:

طريقتان للتغطية الأولى بالبلاستيك (بولى إيثيلين الأسود) والأخرى بقش الأرز، والرش بمبيد الحشائش (الروند اب) وأيضاً العزيق اليدوى مرتين خلال التجربة هذا بالإضافة إلى معاملة المقارنة (ترك الأرض دون إجراء أية معاملات عليها).

* وقد أوضحت النتائج المتحصل عليها أن كل معاملات مكافحة الحشائش المختبرة أظهرت تأثيراً إيجابياً ومعنوياً فى زيادة كل قياسات النمو الخضرى تحت الدراسة. هذا بالإضافة إلى أن قياسات الإثمار المختبرة (عقد الثمار - المحصول سواء كجم أو عدد للشجرة أو طن للفدان أو الزيادة المئوية لمحصول المعاملات) مقارنة بمعاملة المقارنة (الكنترول) قد تحسنت وازدادت معنوياً نتيجة لاستخدام معاملات مكافحة الحشائش مقارنة بمعاملة المقارنة (الكنترول).

* كذلك أشارت النتائج إلى أن الصفات الطبيعية للثمار (وزن - حجم - أبعاد - صلابة الثمرة) وأيضاً الصفات الكيماوية للثمار (النسبة المئوية للمواد الصلبة الذائبة الكلية - النسبة المئوية للحموضة الكلية - النسبة بين كل من المواد الصلبة الذائبة الكلية إلى الحموضة - محتوى الثمار من السكريات الكلية) قد تحسنت معنوياً فى معظم الحالات نتيجة لمعاملات مكافحة الحشائش المختلفة عندما قورنت بمعاملة المقارنة (الكنترول).

* ومن جهة أخرى فإن مكافحة الحشائش المصاحبة لأشجار الكمثرى هى انعكاس لتلك النتائج. وترتيب معاملات مكافحة الحشائش حسب كفاءتها فى تخفيض الوزن الجاف للحشائش هى مبيد الراوند أب بمعدل 4 لتر/فدان، التغطية التربة بالبلاستيك الأسود ثم بقش الأرز ثم العزيق مرتين.

* وعموماً فإنه يمكن القول أن كلا من معاملتى التغطية سواء بالبلاستيك (بولى إيثيلين أسود) أو بقش الأرز كانتا أكثر فاعلية فى تحسين النمو الخضرى وقياسات الإثمار وصفات جودة الثمار وأن كانت المعاملة الأولى أكثر فعالية من الثانية لثمار أشجار الكمثرى صنف "ليكونت". وتليها بقية المعاملات باستخدام مبيد الراوند اب بمعدل 4 لتر/فدان والعزيق مرتين.