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Effect of some weed control methods on growth and fruiting of "Canino" apricot trees.

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Abstract

The present investigation was carried out at the experimental farm of El-Kenater Horticulture Research Station to study the response of some vegetative growth measurements, fruiting parameters, fruit characteristics and leaf nutritional status as well as dry weight of annual and perennial weeds to some weed control methods i.e., hand hoeing , three mulching types (white, black polyethylene plastic and straw of rice) and two herbicides (Round up and Roal) beside unweeded trees (control) of Canino cv. apricot during both 2015 and 2016 experimental seasons. Trees under study were thirteen- year - old, grown in loamy soil under flood irrigation system.

Obtained data indicated that all investigated weed control treatments resulted in a positives effect and exhibited a significant increase in all studied vegetative growth measurements i.e., (shoot length increase, number of leaves /shoot and leaf area). Moreover, the abovementioned treatments significantly increased fruit set % and productivity (yield either kg/tree or ton/fed, number of fruits/tree and yield increment % as compared to control) in both seasons. Furthermore, data revealed that fruit characteristics i.e., (fruit weight, volume, firmness, TSS % and acidity % as well as TSS / acid ratio) were significantly improved when compared to the control. In addition, leaf nutritional status were improved with all treatments from the standpoint of statistic during 2015 and 2016 seasons of study. On the other hand, all weed control treatments were induced significantly effect on reducing the dry weight of weed spices and decreased the weeds population during the first and second seasons on study.

Generally it could be concluded that, both treatments of mulching with black polyethylene plastic and round up were the most effective and superior for controlling weeds, increasing growth , fruiting and fruit quality as well as improving leaf nutrient contents of Canino apricot trees.

Key Wards: Weed control, Apricot trees, Mulching

Introduction

Apricot (*Prunus armeniaca L.*) can be considered as one of the major and the most important popular and favourite deciduous fruits in Egypt, since it has an excellent flavor, nice taste and high nutritional value. In addition, apricot is consumed either as fresh ripe fruits or after industrial processes.

Apricot is botanically belonging to the order Rosales (Roses) and family Rosaceae which includes 20 to 25 species and one thousand of varieties but only few are of commercial importance.

Area cultivated with apricot was enormously increased. It occupied about (17140) feddans with a total area including (15077) feddans as a fruitful area with a total production about (92444) tons in 2014. Ministry of Agriculture and Land Reclamation.

It is well known that, weed competition is one of production problems, which affects growth and fruiting of many fruit crops **(Abo Sayed *et al,* 2005** and **Jerdan 1981).** Hoeing, mulching and chemical herbicides used in weed control in fruit orchard. Each method different in its efficiency **(Sinble *et al* 1997, Elkholy** and **Salim, 2004)** and **Fadlallah *et al* (2010)** found that all used tested weed control treatments significantly decreased the weeds and increasing growth, fruiting and fruit quality of citrus, banana and pecan trees comparing with unweeded treatment.Therefore, a great attention is focused on the different soil management system on weed control in fruit orchard. Soil mulching as agricultural practices play an important role by concerning soil moisture **(Khalifa, 1994)** reduces the deterioration of soil by way of preventing the runoff and soil loss, minimizes the weed infestation and checks the water evaporation. Thus, it facilitates for more retention of soil moisture and helps in control of temperature fluctuation **(Rao and Pathak, 1998).**In addition, mulching improves physical, chemical and biological properties of soil as it added nutrient to the soil, enhances vegetative growth and yield of crops **(Verma *et al,* 2005).** Moreover, mulching boosts the yield by 50-60% over no mulching under rain fed situations **(Dilip-Kumar *et al,* 1990).**

The present investigation was planned and carried out to throw some lights and evaluate the possible the effects of the different methods of controlling weeds i.e.; hand hoeing, three mulching material sources and two herbicides treatments beside bar soil as control (unweeded trees) on some vegetative growth measurements, fruiting parameters and some fruit physical and chemical characteristics, as well as leaf content of some macro-nutrients of Canino apricot trees.

Materials and Methods

The present study was undertaken in the experimental farm at El- Kenater Horticultural

Research Station, Qalyubeia Governorate, Egypt. This investigation has been extended for the two successive seasons of 2015 and 2016 on thirteen –year-old apricot trees Canino cv. budded on local apricot rootstock, grown in clay loamy soil and planted at 5 meters apart under flood irrigation system. Selected trees were healthy, nearly uniform as possible as could in their growth vigour, free from diseases and all selected trees received regularly the same agricultural practices adopt in this region.

Physical and chemical analysis of the experimental soil at (0-30cm) depth were determined according to the methods described by **Piper (1950) and Jackson (1967).**

Table 1. Physical and chemical analysis of experimental soil of apricot orchard at (0 - 30 cm) depth in 2016 season.

A- Physical analysis						
Sand (%)	**Silt (%)**	**Clay (%)**	**Soil texture**	**F.C. (%)**	**W.P. (%)**	**A.W. (%)**
17.20	29.20	53.80	Clay loamy	43.0	20.9	20.3

B- Chemical analysis						
	Available nutrients (mg/kg)			E.C. ds/m	pH	$CaCO_3$
Total	**N**	**P**	**K**		**(1: 25)**	
	683.0	338.0	446.8	1.9	7.9	3.65
Avail.	64.0	14.1	62.1			

The different investigated weed control treatments used in this study were as follows:

1. No cultivated trees or unweeded (control) which was still by its weeds without any weed control during the season.
2. Hand hoeing: it was practiced three times during each season at monthly intervals after winter hoeing, the first hoeing on 3rd week of March and both second and third were done on 3rd week of April and May, respectively.
3. Three types of mulching the soil were:
   - **a.** Black polyethylene plastic used to cover all the soil surface completely under trees. The polyethylene plastic sheet was (14m) wide and (80 micron) thick. The mulch was applied on 3rd week of March on the soil up to the end of the growing season.
   - **b.** White polyethylene plastic sheets was used in the same abovementioned dates.
   - **c.** Straw of rice mulch at 30 cm. thick was spread out on the soil surface to cover the soil completely on the same time of plastic sheets treatment.
4. Two chemicals herbicides were used as follows:
   - **a.** Round up (48%WSC) herbicide (n-phosphonomethyle glycine) common name as glyphosate was used and applied according to the recommended rate (2.0litr /fed.) at one time on April in both seasons.
   - **b.** Roal (24%EC) herbicide Oxyfluorfen (2-chloro -1- (3 - ethoxy - 4 – nitrophenooxy) 4- (trifluoromethyl) benzene known commercially as Roal 24 % EC, was applied at rate (750cm^3 /fed) at one time on March in both seasons.

The complete randomized block design was used for arranging the abovementioned seven treatments, whereas each treatment was replicated three times and each replicate was represented by a single tree. Additionally, on each tree four main branches well distributed around the periphery (one branch in each direction) were tagged and the following parameters were determined:

1. Some vegetative growth measurements:

Ten newly emerging shoots were labeled to measure the length of new shoots, which developed in those branches twice on the 1st week of April and the 4th week of August in both season then, shoot length increase was estimated as follow:

Shoot length increase (cm) = shoot length in August – shoot length in April.

Whereas the average number of leaves per shoot were counted and recorded on the 4th week of August in both seasons of study. Moreover, samples of ten mature leaves were collected by picking the 3rd to 5th one from the base of the previously labeled shoots then, leaf area was measured by using the planimeter.

2. Fruiting parameters:

2. a.Fruit set percentage:

both the total number of flowers at full bloom and the initial number of flowers at the end of blooming stage (set fruitlets) were counted and recorded per each tree in all treatments then, fruit set % was estimated by the following equation according to **Westweed (1978).**

$$\text{Fruit set (\%)} = \frac{\text{Number of set fruitlets}}{\text{TotalNumber of flowers at full bloom}} \times 100$$

2. b.Productivity(yield and yield increment (%) in relation to the control):

Average yield either as kg/tree or ton/feddan and number of fruits per tree for each treatment was calculated and recording at the harvesting time. Moreover, yield increment (%) for each treatment in relation to the control (the efficiency of treatment) was estimated by the following equation according to **kabeel (1998).**

$$\text{Yield increment (\%)} = \frac{\text{yield / treatment - yield / control}}{\text{yield / control}} \times 100$$

3. Fruit characteristics:

At harvesting period (maturity stage), samples of 20 mature fruits from each treatment were randomly collected and the following characters of both fruit physical and chemical properties were determined as follows:

3. a. Fruit physical characteristics:

The average values of fruit weight (gm.), fruit volume (ml^3) and fruit firmness ($Ib/inch^2$) which was determined using pressure tester with 7/18 inch plunger according to **Magness** and **Taylor (1982).**

3. b. Fruit chemical characteristics:

The following three fruit juice of chemical properties were determined as follows:

- Total soluble solids percentage (TSS %) which was determined by using a Carl Zeiss hand refractometer according to **A.O.A.C (2000)**.
- Total titratable acidity percentage, which was as the percentage of anhydrous malic acid estimated according to **Vogel (1975).**
- TSS/acid ratio, was estimated by dividing the total soluble solids % over total acidity %.

4. Leaf nutrient contents:

Leaf content of some macro-elements (N, P and K) were determined. The following procedures were used

- **Total nitrogen content:** total N content of dried samples was determined by the modified micro-Kjeldahl method as described by **Pregl (1945)**.
- **Total phosphorus content:** total P content was carried out colorimetrically using a Spekol spectrophotometer at 882.0 u.v. according to the method described by **Murphy and Riely (1962)**.
- **Potassium content:** leaf K content was determined by using the Atomic Absorption Spectrophotometer (3300) according to **Chapman and Pratt (1975).**

5. Weed survey (dry weight of annual, perennial and total weeds):

Weeds were taken from one square meter of each plot at 6 and 9 weeks after treatments. Weeds were classified into three groups i.e., annual, perennial weeds and their total then dried in oven at 70 °C until constant weights and the dried weeds were weighted. Weeds control was evaluated in the form of percent reduction (R%) in the dry weight of each individual species of weeds as well as the total weeds. Percent reduction (R%) was calculated according to **Topps and Wain (1957)** formula as following

R%= (A-B)/A*100

Where: A= the dry weight of weeds in control

B= the dry weight of weeds in treated plot

Table 2. The dominant weeds species in the experiment during 2015 and 2016 seasons.

Annual weeds	Perennial weeds
Portulaca oleracaea L.	*Cyperus rotundus L.*
Echinochloa colonum L.	*Cynodon dactylon L.*
Xanthium spinosum L.	*Convolvulus arvensis L.*
Bidens bipinnata L.	……..
Lolium temulentum	……
Setaria glauca L	……

- Statistical analysis:

All the obtained data during the two experimental seasons of study were statistically analyzed using the analysis of variance method according to **Snedecor and Cochran (1990).** However, differences among means were distinguished by the Duncan's multiple range test at 5% level **(Duncan, 1955).**

Results and Discussion

1. Some vegetative growth measurements:

Concerning the effect of the different investigated weed control treatments under study on some vegetative growth measurements, it is quite evident from tabulated data in Table (3) that, all studied vegetative growth parameters of Canino apricot trees responded significantly to weed control treatments as compared to the control (unweeded trees) during the first and second seasons of study. However, the greatest statistical values of increase in shoot length were exhibited by those Canino apricot trees treated with both white polyethylene and straw of rice with no differences between them followed in a descending order by both black polyethylene and Round up treatments in the first season only. Meanwhile, results indicated that, the highest number of leaves per shoots was statistically in concomitant to all investigated weed control treatments as compared to the control (unweeded trees) since, the differences between those treatments were completely absent from standpoint of statistic except with hand hoeing treatment. Such trend was detected during both seasons of the study. Moreover, data in same Table showed obviously that the leaf area followed the same trend during both 2015 and 2016 seasons of the study. Whereas, both Round up and black polyethylene treatments were more effective than any weed control treatments that induced statistically the highest values of leaf area

during the two experimental seasons. On the other hand, it could be noticed that in all cases with abovementioned three characters the control trees (unweeded) was significantly the inferior as exhibited the least values of average increase in shoot length(cm) and number of leaves per shoot as well as the lowest value of leaf area during both seasons of study.

The beneficial effects of weed control treatments under study in improving shoot and leaf growth of Canino apricot trees especially soil mulching treatments could be attributed to its effects on soil temperature and keeping soil moisture content which enhanced root growth and increased nutrients uptake via the roots. These results are in a general agreement with those reported by **Hifny *et al* (1994)** and **Zeerban (2004)** on grapevine ; **Zayan *et al* (1994), Fatma-Abou Garah (1999), Pande *et al* (2005)** and **Mikhael (2007)** on apples ; **Fadlallah *et al* (2010)** on pecan and **Helail *et al* (1993)** and **Kabeel *et al* (2011)** on pear trees.

Table 3. Response of some vegetative growth measurements of "Canino" apricot trees to different weed control methods during 2015 and 2016 seasons.

Treatments	Average increase in shoot length(cm)		average number of leaves/shoot		Leaf area(cm^2)	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**
Unweeded trees (Control)	36.17C	34.43E	38.50C	42.57B	37.46E	37.93E
White Polyethylene Sheets	47.50A	49.40A	49.17A	52.70A	46.92C	47.60C
Black Polyethylene Sheets	43.80AB	45.61B	50.96A	53.13A	49.85AB	51.54A
Straw of rice	47.00A	48.10A	50.20A	51.10A	49.17B	49.66B
Round up 48 %	43.79AB	42.86C	50.60A	52.77A	50.96A	52.70A
Roal 24%	42.94B	44.78BC	49.85A	50.73A	49.28B	49.77B
Hand hoeing	42.67B	40.39D	44.20B	46.3 B	40.25D	40.65D

2. Fruiting parameters:

Concerning the fruiting parameters, i.e. fruit set %and productivity expressed as yield kg/tree, ton/fed and number of fruits per tree as well as yield increment % in relation to the control were studied in response to the effect of different investigated weed control treatments during both 2015 and 2016 seasons of study. Data in this respect tabulated in Tables (4).

2. a. percentage of fruit set:

Data in Table (4) displayed obviously that, the percentage of fruit set responded significantly to all investigated weed control treatments as compared to unweeded trees (control) in the two experimental seasons. However, trees treated with both black polyethylene in the two seasons and round up in the first one were statistically the superior as exhibited significantly the highest values of fruit set %. On the other hand, results indicated that an opposite trend was detected with the control treatment which was statistically the inferior as resulted in a significant least value of fruit set % during the first and second seasons of the study. In addition to that, the other remain weed control treatments (Roal, white polyethylene sheets, straw of rice and hand hoeing) were statistically in between the abovementioned two extremes as their effect on fruit set % of Canino apricot trees during both 2015 and 2016 seasons of study.

Table 4. Response of some fruiting parameters (fruit set %and number of fruits per tree of "Canino" apricot trees to different weed control methods during 2015 and 2016 seasons.

Treatments	Fruit Set%		Yield (No. of fruit/tree)	
	2015	**2016**	**2015**	**2016**
Unweeded trees (Control)	7.55D	8.68 E	1534D	1587E
White Polyethylene Sheets	9.58B	10.77BC	1766C	1765D
Black Polyethylene Sheets	11.06A	13.11A	1956AB	2023AB
Straw of rice	9.62B	10.33C	1825BC	1872C
Round up 48 %	10.63A	11.37B	2015A	1975B
Roal 24%	9.92B	10.98B	1885A-C	1977B
Hand hoeing	8.72C	9.68D	1830BC	2063A

2. b. Productivity:

Data obtained in Tables (4&5) displayed clearly that, productivity of Canino apricot trees expressed as number of fruits per tree and either yield in kg/tree, or ton per feddan as well as yield increment (%) for each treatment in relation to the control responded significantly to different investigated weed control treatments as compared to the control treatment (unweeded trees) during both seasons of study. Concerning the yield estimated as number of fruits per tree, data in Table (4) revealed that trees treated with both treatments of round up in the first (2015) season and hand hoeing in the second (2016) one were statistically the superior as resulted in significantly the greatest number of fruits/tree followed in a descending order by treated trees with black polyethylene treatment in the two season of study whereas, differences were not significant between them. On the other hand, the control treatment (unweeded trees) was statistically the inferior as exhibited significantly the least number of fruits per tree during the two experimental seasons. In addition, the other weed control treatments recorded statistically in between values the abovementioned two extends in this concern. Such trend was detected during both 2015 and 2016 seasons of study.

Moreover, both the heaviest yield (kg/tree) and the greatest crop (ton/fed.) were always significantly in concomitant to treated trees with black polyethylene treatment followed in a descending order by trees treated with round up treatment during both 2015 and 2016 seasons. On the contrary, the lightest yield (kg/tree) and the lowest crop (ton/fed.) were statistically in closed relationship to those unweeded trees of Canino apricot (control). However, other remain weed control treatments were significantly intermediate aforesaid two extents with a variable tendency in their effectiveness. Regarding the yield increment % in relation to the control in response to the abovementioned weed control treatments followed typically the same trend previously detected with the average yield either kg/tree or ton/feddan. Such trends were true during the first and second seasons of experimental study. Moreover, In this regard, it could be noticed that, the results are in a general accordance with these previously mentioned by **El-Kassas, *et al* (1993)** on pomegranate, **Mokhtar *et al* (1993)** on plum, **Singh *et a*l (2005)** on apple, **Fadlallah *et al* (2010)** on pecan and **Kabeel *et al* (2011)** on pear concerning fruit set % while, the effect of weed control treatments on yield parameters, **Marks (1991)** on banana, **Fatma Abo-Garah (1999), Zayan *et al* (2004)**, **Pande *et al* (2005)** and **Mikhael and Maddy (2007)** on apple trees, **Fadlallah *et al* (2010)** on pecan and **Said *et al* (1993)** and **Kabeel *et al* (2011)** on pear trees. whereas, they reported that all investigated weed control treatments under study exhibited significantly increased in fruiting parameters behaviors.

Table 5. Response of some fruiting parameters (yield in kg/tree, ton per feddan as well as yield increment (%) in relation to the control) of "Canino" apricot trees to different weed control methods during 2015 and 2016 seasons.

Treatments	Yield Productivity				Yield Increment % in relation to the control	
	Yield (Kg/Tree)		Yield (Ton/Fed.)			
	2015	2016	2015	2016	2015	2016
Unweeded trees (Control)	48.57F	51.68F	8.163F	8.687F	0.01G	0.01F
White Polyethylene Sheets	63.65DE	64.70E	10.70DE	10.87E	31.04E	25.19E
Black Polyethylene Sheets	74.20A	76.77A	12.47A	12.90A	52.69A	48.54A
Straw of rice	65.60CD	69.36D	11.03CD	11.66D	35.06D	34.21D
Round up 48 %	69.92B	74.52AB	11.75B	12.53AB	43.95B	44.20B
Roal 24%	67.47BC	72.83BC	11.34BC	12.24BC	38.91C	40.92C
Hand hoeing	61.93E	70.98CD	10.41E	11.93CD	27.50F	37.35CD

3. Fruit quality:

3. a. Fruit physical characteristics:

With regard to the average fruit weight (gms) and fruit volume (ml^3)in response to the different weed control treatments under study, data represented in Table (5) displayed clearly that both fruit characters were responded significantly to all investigated weed control treatments in comparison with the control (unweeded trees) during both 2015 and 2016 seasons of study. Since, it could be observed from obtained data that the heaviest fruit weight were obtained from trees treated with rice straw followed in a descending order by black polyethylene, round up, white polyethylene and Roal however, difference between the abovementioned five treatments did not reach level of significance during both the first and second seasons of study. Whereas, an opposite trend was noticed with unweeded trees (control) which exhibited statistically the lightest weight of fruits. Meanwhile, hand hoeing treatment was intermediate the abovementioned two extents especially in the first (2015) season.

Concerning the average fruit volume data in same Table indicated that trees treated with both black polyethylene and round up treatments were statistically the superior as exhibited the highest

significant value and the biggest fruits in volume during both the first and second seasons, respectively. On the other hand, the reverse trend was detected with the control (unweeded trees) which was statistically the inferior as induced the smallest fruits and the lowest significant value of fruit volume during both seasons of study. Moreover, other remain weed control treatments recorded in between value the abovementioned two extents in this respect. As for the fruit firmness of Canino apricot trees in response to the different investigated weed control treatments under study, Data tabulated in Table (5) revealed obviously that fruit firmness of Canino apricot trees positively responded by the weed control treatments of black polyethylene , Round up and white polyethylene which produced significantly fruits having firmness flesh texture than the other investigation weed control treatments during both 2015 and 2016 season of study respectively. Differences between a benched three treatments did not reach level of significant. On the other hand, an obvious decrease in fruit fresh firmness was generally noticed with the control (unweeded trees) which was the inferior as exhibited statistically the most softened fruits and the last values of fruit firmness as concerned to all the other treatment under study in both seasons. Moreover, the other weed control treatments were intermediate the aforesaid two extends with so slight increase to be significant in few cases especially in the second (2016) season but in the first (2015) one, differences were completely absent from the stand point of statistics.

Table 6. Response of some fruit physical characteristics of "Canino" apricot trees to different weed control methods during 2015 and 2016 seasons.

Treatments	Fruit Weight (gm.)		Fruit Volume $(ml.)^3$		Fruit Firmness(Ib/Inch2)	
	2015	2016	2015	2016	2015	2016
Unweeded trees (Control)	31.31C	32.66B	30.28D	31.42D	8.77B	9.20D
White Polyethylene Sheets	36.02AB	36.73AB	34.44B	35.01B	9.63AB	10.07A
Black Polyethylene Sheets	37.95AB	37.98A	36.49A	36.38AB	10.45A	10.16A
Straw of rice	39.29A	37.27A	34.68B	36.20AB	9.29B	9.81B
Round up 48 %	36.08AB	37.77A	34.56B	36.89A	10.37A	10.15A
Roal 24%	35.94AB	36.92AB	34.60B	35.38B	9.21B	9.62BC
Hand hoeing	33.84BC	34.43AB	32.92C	33.12C	9.12B	9.50CD

3. b. Fruit chemical characteristics

***Total soluble solids (TSS %)**

Referring the effect of different investigated weed control investigated treatments on the fruit Juice total soluble solids (TSS %), it is worthy to observe from obtained data during both 2015 and 2016 seasons and tabulated in Table (7) that, the beneficial effect and a positive relationship between fruit Juice total soluble solids % of Canino apricot trees from one hand and all studied weed control treatments in the two experimental seasons from another however, fruit Juice TSS% was responded significantly to the various weed control treatments as compared to the control treatment (unweeded trees) in the first and second seasons of study. Since, treated trees with black polyethylene sheets was the superior treatment as exhibited the richest fruits in their TSS content and induced fruits with the highest significant values in total soluble solids %, followed in a descending order by treatments of hand hoeing, straw of rice and white polyethylene sheets whereas, difference between them did not reach level of significance especially in the first (2015) seasons. On the other hand, an opposite trend was noticed with such Canino apricot trees of control treatment (unweeded trees) which resulted significantly in the poorest fruit content and the lowest statistical values of fruit juice TSS % during the two seasons of the study. In addition, both treatments of herbicides i.e., round up and Roal were statistically responded in between to both abovementioned extremes during the two experimental seasons of the study.

***Total titrability acid % (TTA %) :**

Concerning the fruit Juice total acidity % in response to effect of different investigated weed control treatments under study, obtained results in Table (7) displayed clearly that both treatments of control (unweeded trees) and round up in the two seasons followed by Roal treatment in the first (2015) season only were the superior treatments which induced the highest significantly values and the richest fruits in their total acidity % but the difference between them did not reach level of significance. On the other hand, the lowest significant values and the poorest fruits in their total acidity % were always in concomitant to such fruit produced by Canino apricot trees treated with straw of rice treatment during both 2015 and 2016 seasons of the study. Moreover, the other remain weed control treatments under study i.e., white polyethylene sheets, hand hoeing and polyethylene sheets were statistically responded

intermediate the abovementioned two extents, respectively. Such trends were true during both the first and second seasons of the study.

***TSS/Acid ratio:**

Concerning the effect of the different weed control treatments under study in all TSS / acid ratio in Canino apricot fruit juice, data in Table (7) shows that, treated trees with both black polyethylene and round up treatments induced significantly the highest values of TSS/acid ratio followed in a descending order by both treatments of Roal and white polyethylene, difference between the aforesaid four treatment did not reach level of significance. Whereas the other three treatments of weed control (straw of rice, control and hand hoeing) exhibited the last values of TSS/acid ratio with the negligible variation and differences were absent in response from the standpoint of statistic. Such trend was true in the first (2015) season. Moreover, in the second (2016) one, the response was relatively more pronounced as compared to that detected with the first season, however, trees subjected to black polyethylene treatment was the superior as exhibited the highest significant values of TSS/acid ratio as compared to the other weed control treatments. Whereas, unweed trees (control) produced fruits with the lowest statistical values of TSS/acid ratio. In addition to that, fruit juice TSS/acid ratio of the other weed control treatments (straw of rice, hand hoeing, white polyethylene, Roal and round up) were significantly in between the abovementioned two extents since the differences were significant as compared to each other, respectively.

Data obtained with a positive effects of most investigated weed control treatments on improving both fruit physical and chemical characteristics under study were in harmony with those mentioned by **Hifny *et al* (1994)** on grapevine ; **Zayan *et al* (1994), Fatma-Abou Garah (1999), Pande *et al* (2005)**, **singh *et al* (2005), Mikhael (2007)** and **Mikhael and Maddy (2007)** on apple trees; **Fadlallah *et al* (2010)** on pecan trees and **Helail *et al* (1993), Said *et al* (1993)** and **Kabeel *et al* (2011)** on pear trees.

Table 7. Response of some fruit chemical characteristics of "Canino" apricot trees to different weed control methods during 2015 and 2016 seasons.

Treatments	TSS %		Acidity %		TSS/Acid Ratio	
	2015	2016	2015	2016	2015	2016
Unweeded trees (Control)	9.40D	9.733E	0.643A	0.693A	16.82B	14.05F
White Polyethylene Sheets	11.47B	11.55B	0.570BC	0.517CD	19.75AB	22.44C
Black Polyethylene Sheets	12.71A	12.83A	0.533C	0.470DE	23.44A	27.30A
Straw of rice	11.79B	11.30BC	0.440D	0.453E	18.68B	24.97B
Round up 48 %	10.87C	10.83D	0.613AB	0.687A	23.33A	15.80E
Roal 24%	10.60C	10.98CD	0.610AB	0.590B	20.78AB	18.60D
Hand hoeing	11.81B	12.50A	0.550C	0.550BC	16.47B	22.73C

4. Leaf nutritional status:

With regard to the leaf macro-elements (N, P and K) contents of "Canino" apricot trees in response to the effect of different investigated weed control treatments under study, it is quite evident from obtained data in Table (8) that, all studied macro-elements (N, P and K) were responded significantly to the differential weed control treatments as compared to the control (unweeded trees) during both 2015 and 2016 seasons of study.

However, the highest significant values and the richest leaves in their N, P and K contents were inclosed relationship to the treatment of covering soil with black polyethylene sheets followed in a descending order by those of round up treatment as for N and P in spite of differences did not reach level of significance from one hand and white polyethylene sheets as for K content, but differences were significant from the other. Such trend was detected during both seasons of study.

Table 8. Effect of some weed control methods on leaf N, P and K contents of "Canino" apricot trees during 2015 and 2016 seasons.

Treatments	N (%)		P (%)		K (%)	
	2015	2016	2015	2016	2015	2016
Unweeded trees (Control)	2.078E	2.16C	0.16C	0.17C	1.91E	2.17E
White Polyethylene Sheets	2.46B	2.42B	0.23AB	0.24AB	2.41B	2.68B
Black Polyethylene Sheets	2.63A	2.59A	0.26A	0.28 A	2.58A	2.81A
Straw of rice	2.32C	2.38B	0.22AB	0.24AB	2.24C	2.49C
Round up 48 %	2.58A	2.53A	0.25AB	0.27AB	2.33BC	2.53C
Roal 24%	2.42B	2.43B	0.23AB	0.24AB	2.29C	2.42CD
Hand hoeing	2.19D	2.23C	0.20BC	0.22BC	2.08D	2.33D

On the contrary, "Canino" apricot trees of control treatments (unweeded trees) was statistically the inferior as exhibited significantly the least values and the poorest leaves in their N,P and K contents during the two experimental seasons of study. Moreover, both treatments of white polyethylene sheets and Roal were equally effective from the standpoint of statistic for increasing leaf N and P contents whereas, the former treatment (white polyethylene sheets) was statistically the superior than the latter one (Roal) as for the leaf K content. Such trends were during both 2015 and 2016 seasons. On the other hand, hand hoeing treatment was significantly less effective as for increasing the leaf N, P and K contents as compared to any other the weed control treatments in the first and the second seasons of study.

Generally, it could be observed that, obtained data regarding the positive effects of the investigated weed control treatments in this study on leaf nutritional status goes partially in the line with that point out by many investigators, **Sharma** and **Bhutani (1989)** on peach, **Zayan *et al* (1994), Thakur *et al* (1997), Verma *et al* (2005) Mikhael (2007)** on apples.

5. Weed survey (dry weight of annual, perennial and total weeds):

Data in Table (9 &10) displayed clearly that all the investigated methods of weed control treatments decreased the dry weights of the three categories i.e., annual, perennial and their total in the two surveys as compared to the unweeded trees (control) treatments during both 2015 and 2016 seasons. However, sprayed treatment with round up at 2.0 L/fed was the superior treatment on reducing the dry weight (g/m^2) and decreasing the reduction percentage of annual, perennial and their total in the first and second surveys. Meanwhile, roal at 750cm^3/fed, mulching with black polyethylene sheets and mulching with white polyethylene sheets induced the following significant reduction percentage in the dry weight of the total weeds in the two surveys, respectively during the two seasons of study. On the other hand, both treatments of weed control i.e.(straw of rice and hand hoeing) were statistically the following during the two seasons of study, respectively. In addition, it could be noticed that, round up at 2.0L/fed exhibited the highest reduction percentage of total dry weight of weeds, followed by roal, mulching with black polyethylene sheets, mulching with white polyethylene sheets, mulching with straw of rice and hand hoeing respectively as compared to unweeded trees during both 2015 and 2016 seasons of study.

In this concern, these results were supported by the findings of several investigators, **Javkovic (1986)** showed that round up at 10.0L/h., gave the best control of the most dominant weed; **Mokhtar *et al* (1993)** on plum**; Fatma-Abou Garah (1999)** and **Mikhael and Maddy (2007) on** apple trees; **Fadlallah *et al* (2010)** on pecan trees and Said ***et al* (1993)** and **Kabeel *et al* (2011)** on pear trees.

Table 9. Effect of weed control methods on dry weight of annual, perennial and total weeds/m^2 of "Canino" apricot trees during 2015 and 2016 seasons.

Treatments	Dry weight (gm.)					
	Annual weeds		Perennial weeds		Total weeds	
	1st survey	2nd survey	1st survey	2nd survey	1st survey	2nd survey
	2015 season					
Unweeded trees (Control)	494.8A	778.7A	192.9A	253.2A	687.7A	1031.9A
White Polyethylene Sheets	73.3BC	126.2CD	39.8C	98.6B	113.2B	224.8BC
Black Polyethylene Sheets	63.8D	120.6CD	25.3D	94.7B	89.1C	215.4C
Straw of rice	65.7CD	128.2C	26.8D	101.0B	92.4C	229.2BC
Round up 48 %	30.4F	107.8D	18.4E	81.0B	48.7E	188.8C
Roal 24%	52.3E	110.3CD	23.3D	96.3B	75.7D	206.6C
Hand hoeing	76.9B	190.2B	46.4B	106.3B	123.3B	296.5B
	2016 season					
Unweeded trees (Control)	507.9A	822.7A	210.2A	480.1A	718.1A	1302.8A
White Polyethylene Sheets	78.1C	132.5C	40.9BC	106.5C	119.0C	239.0CD
Black Polyethylene Sheets	67.1D	127.5C	27.0CD	99.6C	94.1D	227.1CD
Straw of rice	70.5D	136.5C	29.1CD	110.1CD	99.7D	246.6C
Round up 48 %	36.9F	120.6C	31.8CD	83.7D	68.7E	204.3D
Roal 24%	58.3E	119.5C	25.2D	102.3C	83.5DE	221.8CD
Hand hoeing	89.4B	184.1B	51.9B	122.3B	141.3B	306.4B

Table 10. Effect of weed control methods on reduction percentage of annual, perennial and total weeds of "Canino" apricot trees during 2015 and 2016 seasons.

Treatments	Reduction percentage					
	Annual weeds		Perennial weeds		Total weeds	
	1st survey	2nd survey	1st survey	2nd survey	1st survey	2nd survey
	2015 season					
Unweeded trees (Control)	0.0	0.0	0.0	0.0	0.0	0.0
White Polyethylene Sheets	85.20D	83.80D	79.37 E	50.87CD	83.57E	78.03D
Black Polyethylene Sheets	87.10C	84.50C	83.90D	53.13B	87.03 C	78.97C
Straw of rice	86.73C	83.53E	86.10C	50.80CD	86.57D	77.63D
Round up 48 %	93.90A	86.17A	90.50 A	59.83A	92.93A	81.50A
Roal 24%	89.40 B	85.87B	87.90B	52.23BC	89.00B	79.73B
Hand hoeing	84.47E	75.57F	75.93F	49.90D	82.07F	71.13E
	2016 season					
Unweeded trees (Control)	0.0	0.0	0.0	0.0	0.0	0.0
White Polyethylene Sheets	84.63E	83.87BC	80.50C	77.80C	83.43E	81.60C
Black Polyethylene Sheets	86.80C	84.50B	87.17AB	79.27B	86.90C	82.53B
Straw of rice	86.13D	83.37C	86.10AB	77.10D	86.13D	81.03C
Round up 48 %	92.73A	85.33 A	85.07B	82.57A	90.47A	84.33A
Roal 24%	88.53B	85.47A	87.97A	78.70B	88.37B	82.97B
Hand hoeing	82.40F	77.57D	75.27D	74.50E	80.30F	76.40D

Conclusion

Generally it could be concluded that, both treatments of mulching with black polyethylene plastic and round up were the more effective and superior for controlling weeds, increasing growth , fruiting and fruit quality as well as improving leaf nutrient contents of "Canino" apricot trees than the other weed control methods. However, the mulching with black polyethylene plastic is considered the most favourite treatment of weed control methods because it is the most safe environmental and non polluted treatment for the air and soil.

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تأثير بعض طرق مقاومة الحشائش على النمو والإثمار لأشجار المشمش صنف "كانينو".

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اجري هذا البحث بالمزرعة البحثية بمحطة بحوث القناطر الخيرية بغرض دراسة استجابة بعض قياسات النمو الخضري والإثمار وكذلك خصائص جودة الثمار والحالة الغذائية للأوراق وأيضا الوزن الجاف لكل من الحشائش الحولية والمعمرة لبعض طرق مكافحة (مقاومة) الحشائش مثل العزق اليدوي وثلاث طرق من التغطية (بلاستيك اسود وبلاستيك ابيض وقش الأرز) وكذلك الرش بنوعين من مبيدات الحشائش (راوندأب و رول) هذا بالإضافة إلى معاملة المقارنة (أشجار بدون مكافحة للحشائش) وذلك على أشجار المشمش صنف كانينو خلال عامين 2015 – 2016.

وقد أوضحت النتائج المتحصل عليها إلى أن كل معاملات مكافحة الحشائش تحت الدراسة أدت إلى تأثير إيجابي وزيادة معنوية لكل قياسات النمو الخضري المدروسة (الزيادة في طول النمو – عدد الأوراق / الفرخ – مساحة الورقة) والأكثر من ذلك فان المعاملات السابقة أدت إلى زيادة معنوية أيضا للنسبة المئوية لعقد الثمار والإنتاجية (المحصول مقدرا بالكجم/ للشجرة أو طن/ فدان أو عدد الثمار/ شجرة – وكذلك كفاءة المعاملة) مقارنة بمعاملة الكنترول خلال موسمي الدراسة.

وأيضا أشارت الدراسة إلى أن خصائص جودة الثمار (وزن الثمرة –حجم وصلابة الثمرة – النسبة المئوية للمواد الصلبة الذائبة الكلية والحموضة والنسبة بينهما في الثمار) قد تحسنت معنويا نتيجة للمعاملات السابقة إذا ما قورنت بمعاملة الكنترول ومن الناحية الأخرى فان كل معاملات مكافحة الحشائش أدت إلى نقص معنوي فى الوزن الجاف لأنواع الحشائش كما أدت إلى انخفاض كثافة وعدد الحشائش خلال الموسم الأول والثاني من موسمي التجربة.

وعموما فانه يمكن القول بأن معاملتي التغطية بالبلاستيك الأسود ومبيد الراونداب كانتا أكثر المعاملات فاعلية في مقاومة الحشائش وزيادة النمو الخضري والإثمار وتحسين خصائص جودة الثمار وكذلك تحسين الحالة الغذائية للأوراق من حيث محتواها من العناصر الغذائية وذلك لأشجار المشمش صنف كانينو.