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VEGETATIVE GROWTH, YIELD AND FRUIT QUALITY OF THOMPSON SEEDLESS GRAPEVINES AS AFFECTED BY SOME SOIL MULCHING MATERIALS

Zeerban, S.M.
Hort. Dept., Fac. Agric. (Kafr El-Sheikh), Tanta Univ., Egypt

ABSTRACT

This investigation was carried out during 2002 and 2003 seasons on 15-year-old Thompson seedless grape variety "Banaty" grown at Ebshan, Kafr El-Sheikh, where the soil is moderately alkaline to study the effect of soil mulching with three different materials (black polyethylene, rice straw and bean straw) comparing with bare soil as a control.

The obtained results could be summarized as follows:

1. Black polyethylene (BPE) mulching treatment was the most effective on keeping soil temperature more higher by about 2-3°C than of bare soil and other organic mulching treatments which reduced soil temperature at 7 a.m. and 1 p.m. due to shedding effect of rice and bean straw. In addition, all mulching materials increased soil moisture content and the effect was more pronounced by BPE treatment due to reducing evaporation of water from soil surface.
2. All mulching materials caused significant increased in shoot length (cm) during the growing seasons as well as number and fresh weight of fibrous roots (g) at 0-30 and 30-60 cm soil depth, BPE treatment produced the highest values and rice straw came the second, then followed by bean straw material in both seasons.
3. The positive effect of soil mulching extended to increase the uptake of N, P, K, Ca and Mg nutrients as well as some organic substances in leaves such as chlorophyll and total carbohydrates, especially by rice straw treatment.
4. Soil mulching with rice straw, followed by bean straw not only produced the highest fruit set percentage and yield as number and weight of clusters per vine, but also caused a significant improvement in most physical properties of cluster without any adverse effects on juice chemical properties.
5. Rice straw as soil mulching material attained the highest adhesion force of berries from its pedicels (PAF) on the cluster when compared with the control and other mulching materials in the two seasons. Also, this treatment recorded the highest force needed to crush berry (BCF) as g/cm^2 at harvest time due to increasing flesh firmness of berries.

INTRODUCTION

Thompson seedless *Vitis vinifera* is one of the two main table grape varieties grown in Egypt. It accounts about 30% of the total area of grape plantations Abdel-Kawi *et al.*, 1984. Mulches play an important role by reducing soil erosion, improving soil structure, regular soil temperature, conserving soil moisture and controlling the weed population (Rao and Pathak, 1998) and improving growth and distribution of roots and their absorption of nutrients in grapevines (Zayan *et al.*, 1991) and citrus trees (Zayan, 1991).

The present work was planned to study the possible effects of soil mulching with various materials on vegetative growth, nutrient uptake, yield

and fruit quality of Thompson seedless grapevines grown in Ebshan, Kafr El-Sheikh. Mulching effects on soil temperature and moisture content was also studied.

MATERIALS AND METHODS

The present study was carried out during two successive seasons of 2002 and 2003 on 15-year-old Thompson seedless grapevines grown at Ebshan region, Kafr El-Sheikh Governorate. The vines were planted at 2.5 x 2.5 meters, trained according to the cane pruning system to four canes per vine and eight nodes per cane and subjected to similar cultural practices usually done in this area. The depth of water table is about 120 cm. The orchard soil is classified as clay silt and slightly alkaline (pH = 8.2). The mechanical and chemical analysis of the experimental soil are presented in Table (1).

Table (1):Mechanical and chemical analysis of the experimental soil (0-60 cm).

Mechanical analysis				Chemical analysis		
Clay %	Silt %	Sand %	Texture grade	Soil pH	EC mmhos/cm	SAR
52.22	41.55	6.23	Clay silt	8.2	3.15	4.16

The objective of this experiment was to study the effect of various soil mulches, i.e., rice and been straws as organic materials as well as black polyethylene as inorganic one on root density, nutrient uptake, yield and fruit quality. In addition, the effect on soil temperature and moisture content was also studied. All mulching treatments were compared with a bare soil as control. Black polyethylene sheets with 60 micron thickness, rice straw in 10 cm depth and horse bean straw in 6-8 cm depth were applied on March, 1st of both seasons until the harvest time. The mulched area was about 25 m^2 for each replicate. The experimental design was a randomized complete block. Each treatment included 3 replicates with 4 vines for each.

Soil temperature at 10 cm depth was measured by mercury in-glass thermometers in each replicate. Average temperature for 3 days on July 8, 9 and 10 in both years was calculated. Soil samples were taken at 30 cm depth to determine soil moisture content as percent on dry weight basis, 7 and 14 days after irrigation in July of both years.

Three shoots per cane were sampled in both seasons of 2002 and 2003 at 20 days intervals on 22 April, 12 May, 2 June and 22 June and used for measuring shoot length (cm). Fibrous roots density was determined in soil samples taken in August of both seasons at 0-30 and 30-60 cm depth by soil auger at 100-120 cm from vine trunk horizontally in the four directions. Fibrous roots less than 2 mm in diameter from each sample were cleaned, counted and their fresh weight was determined as g/hole (1508.57 cm^3 soil) according to methods described by (Cahoon *et al.*, 1959 and Ford, 1962).

Twenty petioles were collected from leaves opposite to the first basal cluster on the shoots in May of 2002 and 2003. Petiole samples were thoroughly washed by dipping in 0.001 N HCl, then dried by electric mill, grounded and digested with H_2SO_4 and H_2O_2 for the determination of N, P, K, Ca and Mg as percentage of dry weight. Nitrogen was determined by micro-Kjeldahl Gunning method (A.O.A.C., 1950). Phosphorus was determined colorimetrically by the hydroquinon method (Snell and Snell, 1967). Potassium was determined by flame photometer E.E.L -Model (Jackson, 1967). Calcium and magnesium were determined by Perking-Elemer Atomic absorption spectrophotometer Model 2380 AL, according to Jackson and Ulish (1959) and Yoshida *et al.* (1972).

Fresh leaf samples were taken in May of 2002 and 2003 from each replicate for extracting chlorophyll in 5 ml N.N. dimethyl formamide to determined chlorophyll a and b according to Moran (1982). A known weight of dried and grounded petiole leaves were used for extraction and determination of total carbohydrates as percent on dry weight basis by using phenol-sulphuric acid method according to Dubios *et al.* (1956). Then, the C/N ratio was calculated.

Setting berries per cluster were calculated at June, 14th in both years. Yield as number and weight (kg) of mature clusters per vine was recorded at harvest time (the second week of July). At harvest time, four mature clusters per vine were collected at random to cluster weight (g) and weight of 100 berries (g). In addition, cluster volume in ml was determined by water displacement. The total soluble solids (T.S.S.) were determined by Gallilis hand refractometer and total acidity was determined as tartaric acid equivalent per 100 ml grape juice (A.O.A.C., 1965), then TSS/acid ratio was calculated.

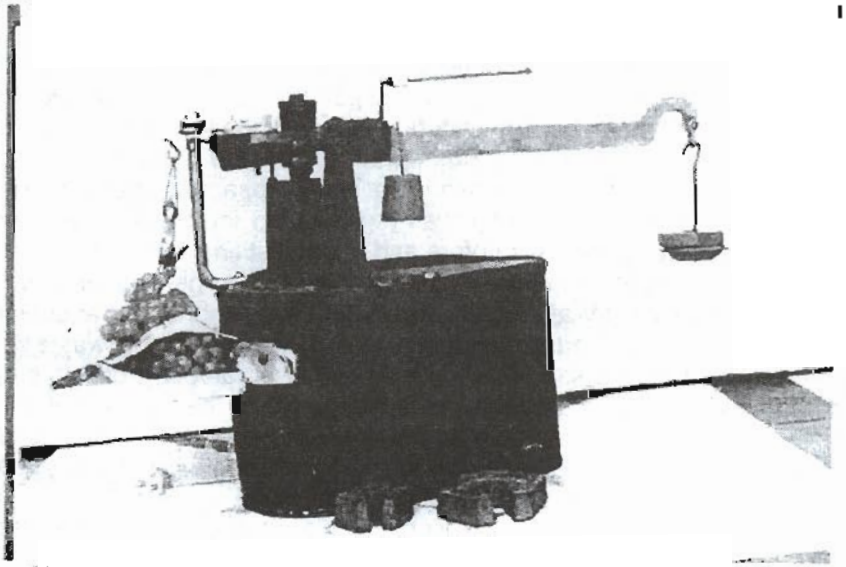

Fig. (1):The apparatus used for measuring the force needed for berry detachment.

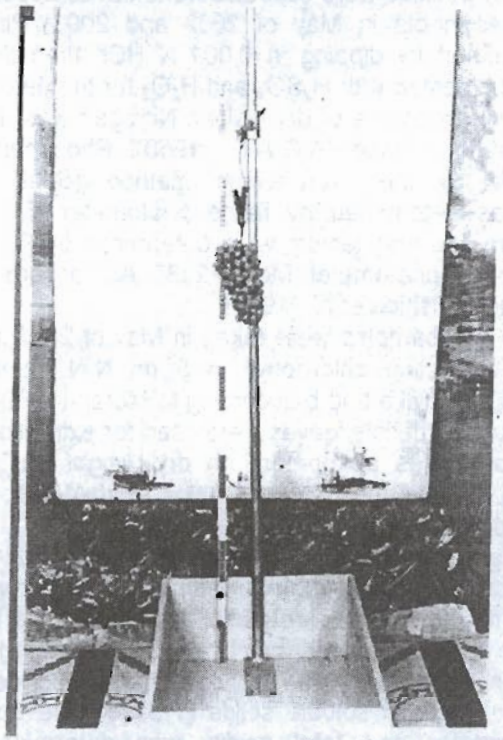

Fig. (2):The apparatus used for estimating the percentage of dropped berries from the cluster after falling down from different heights.

Besides, the force needed for berry detachment from its pedicel was measured as (g), using a new apparatus designed at Horticulture Department, Faculty of Agriculture, Kafr El-Sheikh as shown in the photograph (Fig. 1). This apparatus was designed and adjusted by the help of some specialties for this purpose. The same apparatus was also used to determined the power or strength as (kg) needed for crushing berry with or without its pedicel, at 10 days before and at harvest time in both years.

It was desirable in this study to determined the percentage of dropped berries from the cluster after falling down from different heights at 80 and 120 cm from the ground. Measuring this value will put a light on the waste value of yield expected during harvest and handling after harvest. For this purpose, another simple apparatus was designed to record the number of dropped berries from a cluster at 10 days before and at harvest time, then the percentage of dropped berries was calculated. The using of this apparatus was done as shown in photograph (Fig. 2).

All obtained data were subjected to statistical analysis using a randomized complete block design according to Snedecor and Cochran (1990), and the least significant differences (L.S.D.) were used to differentiate the obtained means.

RESULTS AND DISCUSSION

1.Soil temperature (°C):

As shown in Table 2 it is clear that soil temperature regards under BPE were always higher than under other mulch materials and bare soil (control). In addition, it reached the maximum at 1 p.m. under BPE mulch, then slightly reduced at 7 p.m .These readings were always higher than those recorded for the control at any time of measuring soil temperature in both seasons. It could be concluded that BPE was the most effective one on keeping soil temperature more higher than the control and other organic mulching materials by about 2-3°C in both seasons. Similar results were obtained by Neilsen *et al.* (1986), Zayan *et al.* (1994) and Diaz-Perez and Batal (2002). On the other hand, soil temperature readings under rice or bean straw mulches were always lower at 1 p.m. than that of the control except at night (7 p.m.), at that time soil temperature values were slightly higher than of the control as shown in Table 2. This reduction resulted under rice and bean straw at 1 p.m. could attributed to the shedding effect of three organic materials. Generally, it is clear that rice straw was found to be effective as bean straw in reducing soil temperature especially at 7 a.m. and 1 p.m. The present results were in harmony with those obtained by Zayan (1991), Zayan *et al.* (1994) and Chattopadhyay and Patra (1997).

Table (2):Effect of soil mulching materials on soil temperature (°C) and moisture content (%) in 2002 and 2003 seasons.

Treatments*	Av. soil temperature (°C)**			Soil moisture %	
	7 a.m	1 p.m	7 p.m	7 days after irrigation	14 days after irrigation
2002 season					
Black P.E	27.39	33.20	30.40	32.6	22.1
Rice straw	29.70	30.00	30.60	28.9	21.3
Bean straw	24.90	29.30	31.20	33.2	20.3
Control	26.06	31.00	28.10	25.3	13.2
L.S.D. 0.05	-	-	-	1.3	1.1
0.01	-	-	-	2.4	2.3
2003 season					
Black P.E	27.92	33.10	30.60	31.5	22.2
Rice straw	25.90	30.31	30.86	30.9	15.9
Bean straw	25.00	29.20	31.70	29.5	16.00
Control	26.10	31.40	28.30	22.3	11.5
L.S.D. 0.05	-	-	-	1.2	1.0
0.01	-	-	-	2.2	2.1

* All mulching treatments were applied on March, 1st of both seasons.

**The average for 3 days in July 8, 9 and 10 at 10 cm depth in both seasons.

2.Soil moisture content:

Regarding soil moisture content %, it is clear that all mulch materials used in this study increased the percentage of soil moisture at 7 and 14 days after irrigation as compared with the control (bare soil) in both seasons (Table

2). The differences between all mulching treatments and the control were always significant in both seasons The mulch effect on soil moisture content was more pronounced with BPE material. This means that, all mulch materials especially BPE, conserved soil moisture content by reducing the evaporation rate from the soil surface. This results agrees with the findings of Mbagwu (1991), Sanderson and Cutcliffe (1991), Zayan (1991) and Rao and Pathak (1998). Conclusively, the mulch effect proved to be beneficial in saving irrigation water by about one or two irrigation times. This amount of irrigation water reached 600 m^3 per feddan yearly.

3.Vegetative growth parameters:

a.Shoot length (cm):

It is clear that all mulching treatments significantly increased shoot length comparing with the control at different dates during the growing season from April till the end of June in the two seasons. The highest shoot length came from BPE treatment descendingly followed by rice and bean straw treatments. Then, came the control as shown in Fig. (3). The positive effect of soil mulching materials on shoot growth was reported in several studies by Ayaad *et al.* (1987) on grapevines and Jenson and Buszard (1988) and Zayan (1994) on apple trees. Generally, all mulching materials caused increase in shoot length during the growing season, while bare soil treatment produced the lowest shoot length in both seasons. Conclusively, the positive effect of soil mulching treatments on improving shoot growth of Thompson seedless grapevines may be due to its effects on soil temperature and moisture content as shown in Table (2), which improved root growth and increased nutrients uptake via the roots. Such results were in harmony with those obtained by Thakur *et al.* (1997).

b.Root growth:

Table (3) show the average number and fresh weight g/hole of the fibrous roots of Thompson seedless grapevine at 0-30 and 30-60 cm soil depth during 2002 and 2003 seasons. It is clear that all mulch treatments produced higher values as number and weight (g) of fibrous roots as compared with the control (bare soil). In this respect, BPE treatment gave the highest number and weight of fibrous roots at 0-30 and 30-60 cm depth, followed by rice straw and bean straw treatments. The differences were significant when compared with the control in both two seasons. The positive effect of soil mulching treatments on root distribution determined as number and fresh weight of the fibrous roots could be attributed to regulation of soil temperature and its suitable moisture content which in turn, tended to enhance root growth of treated vines. Similar results were obtained by Abranova (1984), Zayan (1991) and Thakur *et al.* (1997), who found that mulching effect significantly increased fresh weight and the average number of fibrous roots grown under the mulched area. In addition, the improvement in root growth may explain the excessive shoot growth obtained in this study (Fig. 3).

Table (3):Effect of soil mulching materials on number and fresh weight (gm/hole) of fibrous root of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*	Av. number of roots**		Av. root fresh weight gm/hole)	
	0-30 cm depth	30-60 cm depth	0-30 cm depth	30-60 cm depth
2002 season				
Black P.E	1883.72	786.59	4.118	1.747
Rice straw	1865.36	698.49	4.080	1.722
Bean straw	1060.10	501.53	3.581	1.314
Control	620.11	304.24	3.263	1.386
L.S.D. 0.05	0.14	0.13	0.010	0.021
0.01	0.20	0.20	0.014	0.030
2003 season				
Black P.E	1931.26	793.20	4.218	1.808
Rice straw	1875.02	701.30	4.114	1.733
Bean straw	1110.62	613.32	3.800	1.580
Control	769.66	320.50	3.621	1.415
L.S.D. 0.05	0.20	0.16	0.032	0.021
0.01	0.30	0.24	0.051	0.030

* All mulching treatments were applied on March, 1st of both seasons.
**The average number of fibrous roots in (hole) 1508.57 cm^3 or 1.82 kg soil.

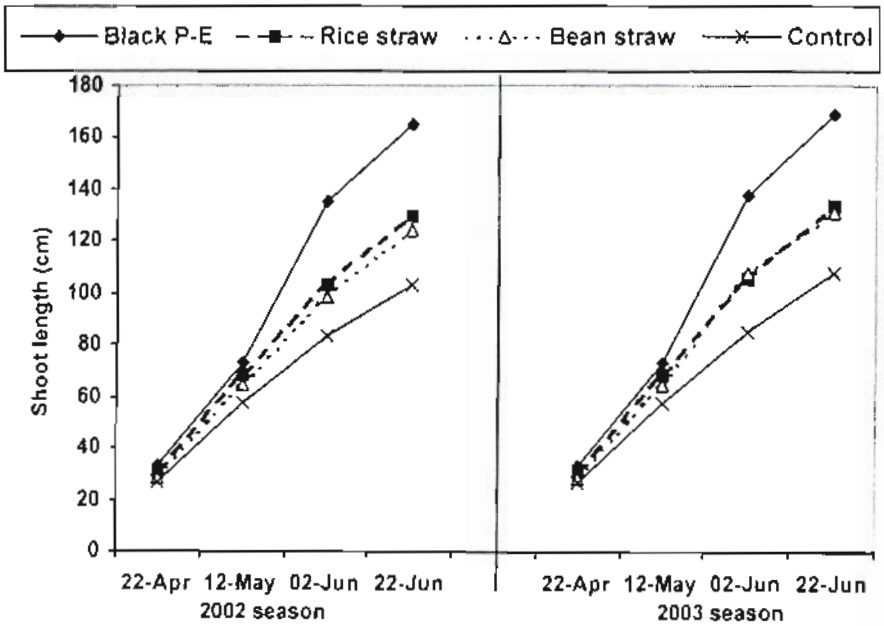

Fig. (3):Effect of soil mulching materials on shoot length (cm) of Thompson seedless grapevines in 2002 and 2003 seasons.

5.Leaf mineral contents:

As shown in Table 4, it is clear that leaf N, P, K, Ca and Mg contents were increased by all mulching treatments in most cases as compared with the control (unmulched treatment) and the differences were significant except for leaf-Mg content in both seasons. Highest values of leaf. P, K and Ca were belonged to rice straw mulching treatment, while the highest values of leaf-N content were belonged to BPE mulching treatment in both seasons. Similar results were reported by Neilsen *et al.* (1986); Zayan *et al.* (1994) and Thakur *et al.* (1997) on apple trees, they found that soil mulching treatment increased leaf N, P, K, Ca and Mg contents especially soil mulching with organic materials, which gave better results than BPE mulching material.

It is possible that increasing the values of leaf N, P, K, Ca and Mg contents were resulted from improving root growth and its respiration rate due to modifying soil temperature and moisture content, which in turn, created a suitable condition for soil microorganisms. These modifications in soil conditions may be responsible for improving nutrient uptake via roots.

Table (4):Effect of soil mulching materials on leaf petiole mineral contents of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*	Macronutrients (%) on D.Wt				
	N	P	K	Ca	Mg
2002 season					
Black P.E	2.75	0.298	1.57	2.88	0.413
Rice straw	2.56	0.301	1.64	2.93	0.417
Bean straw	2.65	0.288	1.63	2.77	0.437
Control	2.44	0.288	1.32	2.62	0.387
L.S.D. 0.05	0.015	0.112	0.89	0.32	N.S
0.01	0.022	0.170	1.13	0.72	N.S
2003 season					
Black P.E	2.76	0.318	1.63	2.60	0.410
Rice straw	2.57	0.321	1.74	3.01	0.419
Bean straw	2.65	0.318	1.73	2.90	0.461
Control	2.53	0.281	1.42	2.63	0.391
L.S.D. 0.05	0.041	0.041	0.69	0.32	N.S
0.01	0.060	0.071	1.02	0.81	N.S

* All mulching treatments were applied on March, 1st of both seasons.

7.Some organic substances in leaves:

a.Total carbohydrates and C/N ratio:

Data presented in Table (5) indicated that total carbohydrates were always higher in leaves of mulched vines than those of the control one. The differences were significant in both two seasons. The highest values belonged to rice and bean mulching treatments descendingly followed by BPE mulching treatment then, came the control. These results may be due to the positive effect of mulching on vine vigor and net photosynthesis so carbohydrates were accumulation. As for the effect of mulching treatments on C/N ratio in

leaves of Thompson seedless grapevines, it is clear that rice and bean straw treatments recorded the highest values while, BPE treatment gave the least value This result may be due to increasing the uptake of nitrogen via the roots under BPE mulch as shown in Table (4). The present results were in harmony with those obtained by Thakur *et al.* (1993) on apple trees.

Table (5):Effect of soil mulching materials on leaf total carbohydrates %, C/N ratio and chlorophyll contents of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*		Total carbohydrates %	C/N ratio	Leaf chlorophyll contents µg/cm²	
				Chl. a	Chl. b
2002 season					
Black P.E		15.98	5.81	39.34	9.68
Rice straw		16.76	6.55	36.78	9.00
Bean straw		16.10	6.59	34.83	8.93
Control		15.36	6.24	33.28	8.23
L.S.D.	0.05	0.15	0.33	0.51	0.26
	0.01	0.23	0.62	0.70	0.39
2003 season					
Black P.E		16.01	5.80	38.54	8.82
Rice straw		16.02	6.24	36.75	8.45
Bean straw		16.03	6.09	34.72	8.06
Control		15.46	6.11	33.44	7.82
L.S.D.	0.05	0.25	0.39	0.51	0.38
	0.01	0.31	0.57	0.74	0.56

* All mulching treatments were applied on March, 1st of both seasons.

b.Leaf chlorophyll content:

It is clear from the data in Table (5) that chlorophyll a and b values in leaves of Thompson seedless grapevines were significantly increased by all mulching treatments when compared with the control in both seasons. The highest chlorophyll a and b values were obtained in the leaves of BPE mulched vines, followed by those of rice and bean straw mulched vines in 2002 and 2003 seasons. This increment in chlorophyll values may be due to increase of the macro-nutrients uptake such as N, P, K, Ca and Mg via the roots. Data in Table (4) supported this explanation. These results are in line with those reported by Zayan (1991).

8.Fruit setting and yield:

Data on soil mulching treatments in Table (6) showed that fruit set percentage was increased significantly by all mulching treatment as compared with the control in the two seasons. Moreover, rice straw followed by bean straw treatments produced the highest fruit set percentage in both seasons. This result means that, berry dropper cluster for rice and bean straw treatment was less than those of the BPE and the control treatment. The beneficial effect of soil mulching treatments may be attributed to its effect on soil temperature and moisture content which affected the absorption of

nutrients especially Ca^{++} via roots as shown in Table (4) compared with the control. This results are in general agreement with those reported by Zayan (1991) on Washington Navel orange trees.

Table (6):Effect of soil mulching materials on fruit setting and yield of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*		Fruits set ** %	Av. cluster weight (gm)	No. of cluster/vine	Yield/vine (kg)
2002 season					
Black P.E		25.33	436.11	18.00	7.85
Rice straw		29.40	480.21	18.95	9.10
Bean straw		27.36	472.97	18.50	8.75
Control		23.95	433.96	16.12	7.00
L.S.D.	0.05	1.74	1.16	0.13	0.17
	0.01	3.12	2.10	0.29	0.26
			2003 season		
Black P.E		23.19	447.10	18.17	8.12
Rice straw		27.22	487.80	19.08	9.30
Bean straw		25.19	473.30	18.70	8.85
Control		20.39	443.94	16.32	7.25
L.S.D.	0.05	1.83	1.82	0.17	0.15
	0.01	3.52	3.20	0.24	0.22

*** All mulching treatments were applied on March, 1st of both seasons.**
**** Fruit set % in June, 14th.**

As for soil mulching effects on yield, data presented in Table (6) indicate that yield of Thompson seedless grapevines was significantly increased as weight (kg) and number of mature cluster by all mulching treatments compared to the control (bare soil). Besides, average cluster weight (g) was also significant increased by all mulching treatment compared with the control (Table 6). Also, rice straw treatment produced the highest yield/ vine with 18.95 and 19.08 kg, respectively in both seasons followed by bean straw and BPE treatments. Economically rice straw as mulching material is superior than BPE due to its low price and benefits by applying organic matter in the soil, thus the mulching effect improved soil environmental conditions, which affected root and shoot growth to produce a higher yield on the treated vines than those grown in the bare soil. Similar results were obtained by Niggli *et al.* (1985) and Zayan *et al.* (1994) on apple, they found that yield (kg/tree) was significantly increased by BPE and other organic mulching materials (rice and rape straw).

9.Physical and chemical fruit properties:

Data in Table 7 showed that cluster physical properties such as cluster volume (cm^3) and weight of 100 berries (g) were improved by all mulching treatments in both seasons. Moreover, rice straw treatment produced cluster with the best physical properties followed by bean straw treatment in the two seasons. However, control vines produced cluster have less physical properties than those produced by all mulch treatments in both seasons. So, rice straw was the best mulching treatment in improvement

cluster physical properties due to suitable moisture content under rice straw mulch as indicated in Table 2. On the other, chemical juice properties such as TSS, acidity and TSS/acid ratio were not significantly affected by all mulching treatments in the two seasons (Table 7). These results are in line with those reported by Ayaad *et al.* (1987) on grapevine, Zayan *et al.* (1991) on orange trees and Zayan *et al.* (1994) on apple trees.

Conclusively, organic mulching treatments improved average cluster weight (g) and volume (cm^3) as well as weight of 100 berries. This may explain the signification increase in yield during the two season. This result makes straw mulching material is superior than BPE due to its low price and adding organic manure to the soil surface without any adverse effects on juice chemical properties of Thompson seedless grapevines.

Table (7): Effect of soil mulching materials on physical and chemical fruit properties at harvest time of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*	Cluster volume (cm^3)	Weight of 100 berries (gm)	T.S.S. %	Acidity %	T.S.S./acid ratio
2002 season					
Black P.E	422.2	150.1	16.20	0.8199	20.60
Rice straw	445.3	169.3	17.90	0.8192	21.83
Bean straw	438.0	166.9	17.60	0.8203	21.47
Control	394.3	141.5	16.00	0.8196	20.60
L.S.D. 0.05	2.88	0.99	N.S	N.S	N.S
0.01	4.20	1.25	N.S	N S	N.S
2003 season					
Black P.E	433.2	160.2	17.20	0.8197	21.00
Rice straw	445 3	179.3	18.10	0.8198	22.07
Bean straw	448.0	176.6	17.80	0.8179	21.76
Control	429.3	152.2	17.10	0.8210	20.83
L.S.D. 0.05	3.34	0.81	N.S	N.S	N.S
0.01	5.05	1.18	N.S	N.S	N.S

* All mulching treatments were applied on March, 1st of both seasons.

10.Pedicel adhesion and berry crushing forces:

a.Pedicel adhesion force (PAF):

Table (8) shows the force needed to detach berries form its pedicel. This force was determined as g at 10 days before and at harvest time. It is clear that, soil mulching treatments increased significantly the adhesion force (PAF). Rice straw mulch vines produced berries needed (315 & 324 g) and (211 & 213 g) to be separated from its pedicel 10 days before and at harvest time in both seasons, respectively. The differences were significant when compared each treatment and the control in both seasons. In addition, rice straw treatment gave the highest values of PAF followed by bean straw and BPE treatment. While, the control recorded the least values. These results may be attributed to the mulching effect on increasing the absorption of Ca, Mg and K nutrients via the roots under mulches. Data in Table (4) supported

this explanation. The role of Ca and Mg elements in fruit cell walls may probably explain the increase of adhesion force (PAF). The present results are in harmony with those obtained by Zayan (1991), who found that, the force needed to detach orange fruits from its pedicel was significant increased by using some soil mulching materials such as rice straw, cut gross and BPE.

Table (8):Effect of soil mulching materials on pedical adhesion force (PAF) gm and berry crushing force (BCF) gm/cm^2 of Thompson seedless grapevines in 2002 and 2003 seasons.

Treatments*	10 days before harvest time			At harvest time		
	Pedical adhesion force (PAF) gm	Berry crushing force (BCF) gm/cm^2		Pedical adhesion force (PAF) gm	Berry crushing force (BCF) gm/cm^2	
		With petioles	Without petioles		With petioles	Without petioles
2002 season						
Black P.E	311.0	1115.8	683.3	208.0	673.0	453.0
Rice straw	315.0	1123.1	695.2	211.0	698.1	471.2
Bean straw	313.0	1120.0	690.0	209.0	680.3	460.4
Control	306.0	1092.0	6.70	203.3	658.7	440.0
L.S.D. 0.05	3.00	3.46	4.46	1.93	3.63	3.78
0.01	4.54	5.29	7.58	2.78	4.92	5.73
2003 season						
Black P.E	318.0	1133.3	686.2	210.0	671.4	450.0
Rice straw	324.0	1151.0	698.4	213.3	691.3	481.3
Bean straw	320.0	1139.2	694.3	216.0	684.1	470.0
Control	309.0	1106.3	667.3	200.6	659.7	436.0
L.S.D. 0.05	3.46	2.43	4.35	2.06	3.99	2.77
0.01	4.47	3.54	6.38	2.94	5.87	4.03

*** All mulching treatments were applied on March, 1st of both seasons.**

b. Berry crushing force (BCF):

As shown in Table 8, all mulching treatments significantly increased the force needed to crush berry (g/cm^2) either with or without its petioles, 10 days before harvest time and at harvest time in both two seasons. The highest values belonged to rice straw mulching treatment, while the control (bare soil) recorded the least values. This means that mulching increased the flesh firmness of berries. This increment in flesh firmness must probably due to increasing Ca and Mg uptake under mulched area. These results are in line with those obtained by Zayan (1991), who reported that, soil mulching with BPE cut grass and rice straw improved fruit firmness of Washington Navel orange. Moreover, berry crushing force (BCF) were always lower at harvest time than before. However, crushing the berry with its petioles needed more force (weight) than crushing it without petioles (Table 8). Also, the obtained data indicated that rice straw treatment appear to be beneficial for increasing berry flesh firmness of Thompson seedless grape fruits.

11.The percentage of dropped berries:

Fig. 3 shows the effect of soil mulching materials on dropped berries from cluster at 80 and 120 cm heights, at 10 days before and at harvest time

of Thompson seedless grapevines in both seasons it is clear that, rice and bean straw treatments were slightly reduced this percentage but the differences was not significant compared with control in both seasons. However, control vines recorded the highest percentage of dropped berries from its cluster at the two height (80 and 120 cm) 10 days before and at harvest time. The increment in pedicel adhesion force (PAF) needed to detach berry from its pedicel may explain the reduction of the percentage of dropped berries from the cluster resulting under soil mulching conditions. Similar results were obtained by Zayan *et al.* (1994) on apple. They found that the percentage of preharvest fruit drop was significantly reduced by black PE and rice straw mulching materials. From the previous mentioned results, it could be said that rice straw as the best mulching treatment appear to be promising for increasing yield of Thompson seedless grapevines.

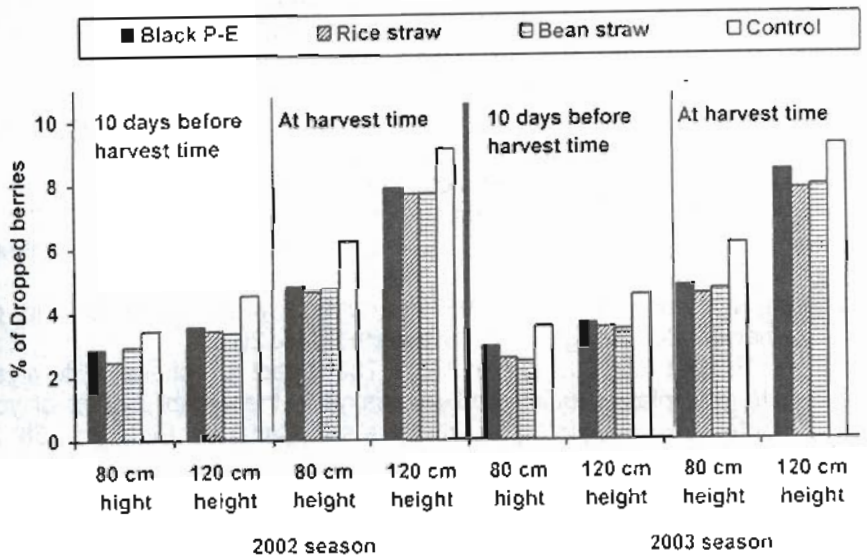

Fig. (4):Effect of soil mulching materials on the percentage of dropped berries from cluster at 80 and 120 cm heights at 10 days before and at harvest time of Thompson seedless grapevines in 2002 and 2003 seasons.

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تأثير بعض مواد تغطية التربة على النمو الخضرى والمحصول وجودة الثمار فى العنب البناتى

سمير محمد زعربان

قسم البساتين ـ كلية الزراعة بكفرالشيخ ـ جامعة طنطا

أجريت هذه التجربة خلال موسمى ٢٠٠٢ ، ٢٠٠٣ على شجيرات صنف العنب البناتى عمرها ١٥ سنة النامية فى منطقة ابشان بمحافظة كفرالشيخ حيث التربة متوسطة القلوية بهدف دراسة تأثير تغطية التربة بثلاث مواد مختلفة هى البلاستيك الأسود وقش الأرز وتبن الفول بالإضافة للتربة المكشوفة للمقارنة.

والنتائج المتحصل عليها يمكن تلخيصها كما يلى:

١- تعتبر معاملة التغطية بالبلاستيك الأسود الأكثر تأثيرا فى الحفاظ على درجة حرارة التربة أعلى بحوالى ٢-٣°م من الكنترول وباقى معاملات التغطية بالمواد العضوية والتى تخفض درجة حرارة التربة الساعة ٧ صباحا ، ١ بعد الظهر نتيجة لتأثير التظليل لقش الأرز وتبن الفول بالإضافة لذلك فإن جميع مواد التغطية تزيد من المحتوى الرطوبى للتربة ، كما يزداد هذا التأثير مع معاملة التغطية بالبلاستيك الأسود نتيجة لتقليل بخر الماء من سطح التربة.

٢- أدت جميع مواد التغطية إلى زيادة طول النموات بالسم خلال موسم النمو بالإضافة إلى زيادة عدد جذور الأمتصاص ووزنها الطازج بالجم على عمق ٠-٣٠ ، ٣٠-٦٠سم من سطح التربة ، وقد أعطيت معاملة التغطية بالبلاستيك الأسود أعلى القيم وتلتها معاملة التغطية بقش الأرز ثم تبن الفول فى كلا الموسمين.

٣- أدى التأثير الإيجابى لتغطية التربة إلى زيادة امتصاص عناصر النيتروجين والفوسفور والبوتاسيوم والكالسيوم والماغنسيوم علاوة على زيادة محتوى الأوراق من بعض المواد العضوية مثل الكلوروفيل والكربوهيدرات الكلية وبصفة خاصة مع معاملة التغطية بقش الأرز.

٤- لم تؤدى فقط تغطية التربة بقش الأرز وتبلها تبن الفول إلى الحصول على أعلى نسبة عقد ثمار وأعلى محصول كمثد ووزن عناقيد/كرمة بل أيضا أدت إلى تحسين معظم الصفات الطبيعية للعناقيد بدون أى تأثيرات ضارة على الصفات الكيماوية للعصير.

٥- اعطت معاملة التغطية بقش الأرز أعلى قوة التصاق للحبات بالحامل الثمرى مقارنة بالكنترول ومواد التغطية فى كل من سنتى الدراسة. كما سجلت هذه المعاملة أيضا اعلى قوة لازمة لتهشيم الحبه بالجم/سم² وقت الجمع نتيجة لزيادة صلابة لحم الحبات.