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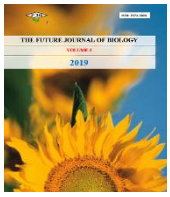
The Future Journal of Biology

Print ISSN: 2572-3006 Online ISSN: 2572-3111

Future Science Association



Future J. Biol., 4 (2022) **10-22**

OPEN ACCES

DOI: 10.37229/fsa.fjb.2022.12.20

COVERING VINES AND MULCHING SOIL FOR IMPROVING OF MICROCLIMATIC, GROWTH AND FRUIT QUALITY OF PRIME SEEDLESS' GRAPEVINES

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ABSTRACT: This investigation was carried out in a private farm located at South Tahrir, Badr town, Behaira Governorate, Egypt. Throughout the two following seasons (2018 and 2019) to examine the impact of plastic covering and mulching soil of Prime Seedless grapevines on their earliness, physical and chemical characteristics, microclimate, soil, growth, and fruit quality. Five treatments were carried out as follows: control, covering vines with white plastic, mulching soil with white plastic, mulching soil with black plastic and mulching soil with rice straw. Cover vine (white plastic) and soil mulch (white, black plastic and straw rice) treatments after dormex application pending the first day of January till last week of April. The results showed that cover vine (white plastic) and soil mulch (white, black plastic and straw rice) application had the best results in comparison with untreated in both seasons. In addition, covering vines with white plastic achieved the best results in early bud-burst, flowering and harvest time, improving microclimatic, vegetative growth, yield and physical and chemical characteristics of berries. While, mulching soil with black plastic gave the best result in soil temperature. The best net profit of Prime Seedless' grapevines was obtained with covering vines with white plastic.

Key words: Plastic covering; mulching soil; Grapes; Microclimatic; Yield; Fruit quality

INTRODUCTION

Grape (*Vitis vinifera* L.), a member of the vitacea family, is among the important fruit crops globally in terms of the area harvested and economic value. Due to customer acceptance, grape varieties command a high marketing position in the Egyptian market. **(Mohamed and Sayed 2021).** Prime grape cultivar is a sizable, seedless berry that is creamy white in colour. Its high sugar content gives it a sweet flavour with a hint of muscat, as well as a significantly higher juice level. Very early ripening prime grapevine has an amber hue, a muscat flavour, a crisp taste, and a long shelf life. **(Perl *et al.*, 2013)**. Prime grape cultivar is quite fruitful and, depending on the growth environment, can have half-long bearers or spurs. (**Van Der Merwe, 2014).**

The table grapes market is struggling with oversupply. The market's prices therefore sharply decline. On the contrary, early ripping (before 15-30 days from the usual harvesting time) leads to a 40% increase in the total income. Covering vines technique to improve fruit, bunch quality, and vines could be covered with plastic sheet to protect grapes leaves as well as bunches from unsuitable sun radiation, wind, hail, rain, and frost (**Novello and de Palma 2008**). Protected agriculture of grapevines blow plastic sheets in order to move their ripping is of most importance, especially in Mediterranean countries. These nations have a potential value for the early ripening of cultivar grapes blow plastic sheets without heating **(Uzun, 1993).** In Cyprus and Italy, this Cardinal cultivar method produced an earliness of 20 days and 20–30 days, respectively. **(Uzun and Özbaş, 1995).** A microclimate is created in the grapevine covering them with plastic materials. As a consequence of this, plastic covers cause to hasten grape ripening and can resist harsh climate conditions such as heavy rains, frost, rains, and hailstones. In order to advance their maturity, grapevines must be carefully cultivated beneath plastic covers, especially in the Mediterranean nations (**Coban, 2004).**

Soil mulching is one of the often used practices in agricultural production. It is a crucial part of integrated canopy farming organic and involves agricultural waste, covering, and grass mulching. (**Bavougian and Read, 2018)**. Over the past ten years, there has been a significant improvement in the use of plastic mulch in agriculture all over the world. Benefits including moisture conservation, hence increased the yield, elevated soil temperature, and better utilisation of soil nutrients are to blame for this increase. **(Kasirajan and Ngouajio, 2012).** By altering the surface's radiation budget and reducing soil water loss, plastic mulches have a direct impact on the microclimate in the area around the plant. Increasing the consistency of soil moisture **Liakatas *et al.*, (1986)**. The planting bed's soil temperature is increased, promoting quicker crop development and earlier harvest, **Lamont (1993)**. Three primary colors are utilised commercially in crop production that don't degrade as mulch. Black, white, and the collection of white, white-on-black reflecting mulches, according to **Ham *et al.*, (1993).**

Mulching straw provides a number of benefits: it balances the soil temperature by lowering the highest soil temperature (**Zhang *et al.*, 2009**), and raising the minimum soil temperature **(Balota *et al.*, 2014).** Also, it influences the microbial biomass in the soil **(Chen *et al.*,2007).** Mulching dramatically raises microbial biomass, according to studies **(Guo *et al.*, 2013).** Moreover**,** it may change the organic carbon balance in the soil. The amount of soil organic carbon and organic residues has been discovered to be positively correlated (**Bationo *et al.*, 2004**). In addition, it may encourage the activity of soil enzymes. In comparison to conventional tillage, straw mulching treatment had increased enzyme activity and metabolic index **(Masciandaro *et al.*, 2004). Helaly *et al*., (2017)** reported that the use of mulching treatments enhanced total yield and early berry ripening.

So, the aim of this study was the effects of covering vines and mulching soil on the physical and chemical properties of microclimatic, soil, growth, and fruit quality of 'Prime seedless' grapevines.

MATERIALS AND METHODS

This research was performed during two successive seasons (2018 & 2019) in a private vineyard located at South Tahrir, Badr city, Behaira Governorate, Egypt. On Prime grapevines, Egypt. The selected vines were seven years old, cultivated in sandy soil, spaced 2 x 3 meters apart, watered by drip irrigation, and supported by a Spanish Parron trellis system. During the two years of the study, the vines were clipped on first day January. Prime grapevines were trained according to quadrilateral cordon and spur pruned by leaving 9 spurs with two nodes on each cardon, the total load was 72 nodes. After the berry set crop load at all vines was modified to 24 clusters per vine. The common agricultural techniques utilised in the vineyard, such as irrigation, pest management, dormex application, and soil fertilization, were applied to all of the vine grapes. Soil fertilization including the addition of 20 m^3/fed organic manure, 150 kg calcium superphosphate (15.5% P_2O_5), 200 kg ammonium nitrate (33% N), and 100 kg potassium sulfate (48% K_2O)/ feddan. Organic manure (0.25% N) was added once in the second week of December.

Five treatments were used in the trial, and they were set up in a completely randomized design. Ninety uniform vines were chosen. Every six vines acted as a replicate and every three replicates acted as a treatment. Cover vines (white plastic) and soil mulch (white, black plastic, c, and rice straw) application following dormex application during the first week of January until the end of April **(Bowen *et al*., 2004).**

Five treatments were performed as follows:

1- Control
2- Covering vines with white plastic
3- Mulching soil with white plastic
4- Mulching soil with black plastic
5- Mulching soil with rice straw

The following parameters were determined on selected vines during the two studied seasons

Dates of phonological stages

The dates of bud-burst, flowering and harvest time were recorded.

Microclimatic data

During the growing season from veraison stage to harvest stage, the microclimatic data for the vine canopy, including light intensity (watt/m2), air temperature (C), and relative humidity (%), were measured on a weekly basis at the cluster's zone **(Ghada, 2015).** The Scheduler Plant Stress Monitor (Model R/O Consuitant- Standard Oil Company, U.S.A) was used to measure the microclimatic parameters.

- Air temperature inside vine.

- Relative humidity (RH %)

- Light intensity.

Morphological characteristics of vegetative growth

After the fruit set, the following morphological traits were measured on five non-fruiting shoots per vine as follows:

-Shoot diameter (cm)

- Shoots length (cm)

- Number of leaves/ shoots

Yield and physical characteristics of cluster

Harvesting indices (SSC% and acidity%) were weekly monitored from veraison till maturity when SSC reached about 16-17% according to **Sabry *et al.* (2009),**

-Yield/vine was determined by multiplying the number of clusters/vines by the average cluster weight.

The grape was brought to the laboratory for the following determinations.

- Cluster weight (g).

- 50 berry weight (g).

-Average berry dimensions (length and diameter) (mm) were measured.

- Shot berries (%) were determined as the percentage by dividing the number of shot berries per cluster by the total number of berries per cluster

Chemical characteristics of berries

- Total soluble solids (SSC %) in berry juice using a hand refractometer.

- Total titratable acidity (as tartaric acid %) according to the Official Analysis Methods **(A.O.A.C., 2000).**

- SSC /acid ratio.

- Reducing sugars percentage was determined as described by **Sadasivam and Manickam (2004).**

The soil temperature

It was taken at three levels:

- At the soil surface.

- At 5 cm depth.

- At 20 cm depth

The soil temperature was revealed at these levels using a Celsius thermometer to calculate the effect of treatment on the change in the temperature around the vine roots.

Costs and net profit /feddan

Yield/ feddan ton (average two seasons) =Yield (kg fruit/vine) x Number of vines/1000.

Total costs / feddan (L.E.) = Treatments costs/ feddan (L.E.) + Costs of cultural practices/ feddan (L.E.).

Total production/ feddan (L.E.) = Yield/ feddan Kg x price of one Kg.

Net profit / feddan (L.E.) = Total production/feddan (L.E.) - Total costs / feddan (L.E.).

Statistical analysis

The completely randomized design was adopted for the experiment with three replicates. Homogeneity of error variance for all variables was measured before the analysis of variance (ANOVA). The statistical analysis of the obtained data was established according to **Snedecor and Cochran (1980).** The average was compared using the LSD values at a 5% level.

RESULTS AND DISCUSSION

Dates of phenological stages

Data presented in Table (1) showed the effect of plastic covering vines and mulching soil treatments on the phonological phases of prime Seedless grapevines during 2018 and 2019. The findings took a similar tendency during the two investigated seasons. Such data indicated that covering the vines with plastic advanced the dates of phenological stages such as budburst, flowering, and harvest time come to pare mulching soil treatments. Plastic covering vines early flowering about 17 to 21 days compared with vines untreated. In addition, plastic covering the vines faster harvest time of 19-25 than under open field during the two studied years, respectively. The treatment of covering the vines with plastic was faster budburst, flowering, and harvest time than mulching soil with plastic and rice straw during the two studied seasons.

The plastic covering of prime Seedless' grapevines has a positive effect in earlier all phenological phases., higher temperatures during January under plastic covers cause an earlier budburst, due to the higher temperatures under plastic covers, especially after flowering time, then leading to an early version phase and harvested about 17-22 days than vines grown in the open field **Salem *et al*., (2021).** The soil temperature in the growing bed is raised, encourage quicker crop production and earlier harvest, **Lamont (1993**). In addition, in order to obtain an early harvest, covering materials are practically employed in the grape production, **(Roberto *et al*., 2011).** Increasing air temperature enhanced the dates of all phenological phases, especially harvest time, **(Novello and de Palma, 2008; Suvocarev *et al*., 2013 and Doaa, 2018**). Benefits of soil mulching include improved crop yields, moisture conservation, higher soil temperatures, and more effective utilisation of soil nutrients, **(Kasirajan and Ngouajio, 2012)**. Mulching treatments early ripping, and total yield, (**Healy *et al* 2017**). These results are in accord with the findings of **Igoune *et al*., (1995); Bedrich (2005); Coban, 2007; Cardoso *et al*., 2008; and Chavarria *et al*., 2012**

Table 1. Effects of plastic covering vines and mulching soil on the dates of phenological stages of 'prime Seedless' grapevines during 2018 and 2019 seasons

Treatments	Characteristics	Bud-burst		Flowering		Harvest time	
		2018	2019	2018	2019	2018	2019
T1	**Control**	30/01	05/02	10/04	13/04	09/06	29/05
T2	**Covering vines with white plastic**	23/01	24/01	22/03	20/03	14/05	10/05
T3	**Mulching soil with white plastic**	26/01	26/01	03/04	04/04	22/05	20/05
T4	**Mulching soil with black plastic**	28/01	29/01	05/04	05/04	27/05	24/05
T5	**Mulching soil with rice straw**	29/01	01/02	08/04	07/04	04/06	28/05

Microclimate data

The microclimate data of prime Seedless grapevines, such as air temperature, relative humidity, and light intensity were affected by all the plastic covering vines and mulching soil treatments in both seasons (Table 2). Covering vines with white plastic produced the highest significant light intensity, air temperature, and relative humidity compared with other treatments in both seasons. However, both mulching soil with plastic treatments significantly increased the grapevine air temperature, relative humidity, and light intensity more than the mulching soil with rice straw treatment. While, the untreated gave the lowest values of air temperature, relative humidity, and light intensity, in both years.

A microclimate is created in the vineyards, covering them with plastic materials. As a consequence of this, plastic covers cause to hasten grape maturity and can resist harsh climate conditions such as air temperature, relative humidity, and light intensity. In order to advance their maturity, grapevines must be carefully cultivated beneath plastic covers, especially in the Mediterranean nations, (**Coban, 2004).** In addition, the grapevine requires a lot of light, and the duration and intensity of the incoming light have an impact on the grapevine's phenology **(Galet, 2000).** Higher discrepancies between covered and uncovered vines may be attributable to stomatal opening that is facilitated by plastic covering since transpiration is constrained by low sun radiation, **(Cardoso *et al.*, 2008; Chavarria *et al*., 2009).** White on black reflecting mulches can result in a modest increase or even a slight decrease in soil temperature compared to bare soil, tending to limit variations in soil temperature. Because they reflect the majority of the incoming solar radiation into the plant canopy. Covering grapevine will change the solar radiation properties, **(Smart, 1985 Reynolds *et al*., 1996).** By altering the surface's radiation budget and reducing soil water loss, plastic mulches have a direct impact on the microclimate in the area around the plant, **Liakatas *et al.*, (1986).** These results confirmed the finding of **Igoune *et al*. (1995) and Bedrech (2005) .**

Table 2. Effects of plastic covering vines and mulching soil on the light intensity, air temperature, and relative humidity of 'prime Seedless' grapevines during the 2018 and 2019 seasons

Treatments \ **Characteristics**		**Air temperature (ºC)**		**Relative humidity (%)**		**Light intensity (watt/ m²)**	
		2018	**2019**	**2018**	**2019**	**2018**	**2019**
T1	**Control**	20.5	20.5	34.00	34.00	38.66	39.33
T2	**Covering vines with white plastic**	26.0	26.3	36.04	37.01	41.33	42.33
T3	**Mulching soil with white plastic**	25.7	25.6	35.19	35.38	40.33	40.6
T4	**Mulching soil with black plastic**	24.1	24.4	34.63	34.73	40.0	41.0
T5	**Mulching soil with rice straw**	22.5	22.8	34.85	35.65	39.66	40.33
	L.S.D at 5%	1.7	1.2	0.7	0.5	1.02	1.28

Vegetative growth parameters

Average growth parameters of grapevines in response to the plastic covering vines and mulching soil treatments in Table (3). Results revealed that covering vines with white plastic, at both seasons significantly enhanced shoot length, shoot diameter, and the number of leaves per shoot compared to mulching soil treatments. All these parameters were significantly increased to response of the covering vines and mulching soil treatments compared to the untreated control. Furthermore, of these growth traits no significant deference was between mulching soil with plastic and mulching soil with rice straw. While, the lowest values in this respect were recorded by control.

The increments in vegetative growth parameters of prime Seedless grapevines as a result of directly impact the microclimate surrounds the vines by modifying the radiation budget and temperature of the surface, **(Liakatas *et al*., 1986).** Grapevines under plastic cover tend to have leaves with a larger area, since the suitable conditions (light and temperature) led to increasing shoot length, diameter, and the number of leaves / shoot, **Chavarria *et al*., (2009).** The soil under plastic mulch remains loose, free, able, and well-aerated. Vine roots have access to adequate oxygen and microbial activity is improved resulting in development vine vegetative growth (**Parmar *et al.*, 2013**). **Salem *et al.*, (2021)** showed that covered vines significantly increased vegetative growth parameters.

Table 3. Effects of plastic covering vines and mulching soil on vegetative characteristics of 'prime Seedless' grapevines during 2018 and 2019 seasons

Treatments \ Characteristics		Shoot length (cm)		shoot diameter (cm)		Number of leaves/ Shoot	
		2018	2019	2018	2019	2018	2019
T1	Control	140.6	143.3	1.12	1.14	18.95	19.52
T2	Covering vines with white plastic	159.0	161.0	1.32	1.35	22.71	23.0
T3	Mulching soil with white plastic	148.3	151.6	1.23	1.27	21.19	21.66
T4	Mulching soil with black plastic	151.6	155.6	1.26	1.30	21.66	22.23
T5	Mulching soil with rice straw	150.0	155 .0	1.25	1.30	21.42	22.14
L.S.D at 5%		7.1	7.9	0.05	0.06	1.02	1.02

Yield and its components

Data presented in Table 4 show that plastic covering vines and mulching soil treatments of prime Seedless grapevines significantly increased yield per vine, cluster weight, and 50 berry weights as compared with control during both seasons. The application of covering vines with white plastic gave the highest values in yield per vine, cluster weight, and 50 berry weight during two studied seasons, Also, non-significantly differences between mulching soil with plastic and mulching soil with rice straw on yield per vine, cluster weight, and 50 berry weight were clear. However, the control treatment recorded the lowest value yield per vine, cluster weight, and 50 berry weights in these respect during both seasons.

The promotion impact of plastic covering vines and mulching soil on the yield characteristics of vine involving yield per vine, cluster weight, and 50 berry weights may be due to reduce weed population, resulting in less competition for nutrients and, to some extent, improved water availability due to moisture preservation by plastic mulching. Benefits of covering vines and soil mulching include improved crop yields, and more effective utilisation of soil nutrients (**Kasirajan and Ngouajio, 2012).** Treatments with mulch and cover vines enhanced overall yield, early yield, and fruit yield in same measure (**Healy *et al.*, 2017**). Also**, Salem *et al.*, (2021)** indicated that covering the vines significantly increased the yield/vine and cluster weight compared to uncovered ones. **Shrestha *et al.*, (2000)** worked on Beauty Seedless grapes and found that the vines growing under plastic cover to the color change stage produced increase yield. Several studies also indicate to the improvement of environmental factors for enhancing vine development, grape quality, and yield, Ekinci **and Dursun (2009) and Abou El-Yazied and Mady (2012). Phadung *et al*., (2005)** showed that plastic mulching increased fruit weight more than no mulching but fruit cluster weight was not affected by mulching treatments**.** The obtained results agree with those reported by **DeSouza *et al*., (2015 and Abdel Elwahed *et al*., (2015).**

The response of used treatments plastic covering vines and mulching soil on the physical properties of berries during the 2018 and 2019 seasons are presented in Table 5 In general, all used treatments showed a positive significant influence as compared to control in both seasons. More clearly, all treatments covering vines and mulching soil significantly decreased shot berries compared to the control. Also, data in Table 5 showed that covering vines and mulching the soil of prime Seedless grapevines significantly enhanced berry length and diameter as compared with the control. Covering vines with white plastic gave significantly highest values in this respect as compared with other treatments. Also, data showed non-significant differences between mulching soil with plastic and mulching soil with rice straw on berry length and diameter in both seasons of study.

The promotion effect of plastic covering vines and mulching soil on the improved physical characteristics of grapes may be attributed to the improvement impact of plastic treatments on vegetative growth in Table (3)., as well as on availability and the microclimate surrounds the vines by modifying the radiation budget in Table (2) and temperature of the surface which reflected in the increase in the weight of the berry and diameter. **Salem *et al*., (2021)** indicated that covering vines significantly improved the berry quality and increased the berry weight, compared to uncovered ones. This finding might gain support from the work previously done by **Novello *et al.*, (2000), Shrestha *et al.*, (2000) and, Phadung *et al.*, (2005)** showed that plastic mulching increased fruit weight and diameter more than no mulching.

Table 4. Effects of plastic covering vines and mulching soil on Yield and cluster weight and 50 berry weight of 'prime Seedless' grapevines during 2018 and 2019 seasons

Treatments \ Characteristics		Yield/vine (Kg)		Cluster weight (g)		50 berry weight (g)	
		2018	2019	2018	2019	2018	2019
T1	**Control**	10.84	11.2	451.66	466.66	204.99	209.69
T2	**Covering vines with white plastic**	14.0	14.32	583.33	596.6	250	265.15
T3	**Mulching soil with white plastic**	11.50	12.24	479.33	510.0	217.87	225.75
T4	**Mulching soil with black plastic**	11.6	12.8	483.33	533.33	219.69	242.42
T5	**Mulching soil with rice straw**	11.92	12.8	496.66	533.3	232.42	235.42
New L.S.D at 5%		0.98	0.81	41.1	34.1	20.6	13.1

Table 5. Effects of plastic covering vines and mulching soil on berry physical properties of 'prime Seedless' grapevines during 2018 and 2019 seasons

Treatments \ Characteristics		Shot berries (%)		Berry length (mm)		Berry diameter (mm)	
		2018	2019	2018	2019	2018	2019
T1	**Control**	7.96	7.46	20.0	21.0	18.0	19.0
T2	**Covering vines with white plastic**	4.53	4.5	22.33	22.66	20.3	20.66
T3	**Mulching soil with white plastic**	6.96	6.2	21.66	22.33	19.6	19.66
T4	**Mulching soil with black plastic**	6.06	5.73	21.33	22.33	19.33	20.33
T5	**Mulching soil with rice straw**	6.2	5.73	21.0	21.66	18.66	20.0
New L.S.D at 5%		1.34	1.76	0.81	0.68	0.80	0.68

Chemical properties of berries

The results indicated that plastic covering vines and mulching soil improved chemical characteristics when compared with control. In addition, covering vines with white plastic improved chemical characteristics superior to mulching soil treatments. The greatest values soluble solids content (SSC), SSC/acidity ratio, and reducing sugars content, as well as the lowest titratable acidity, were recorded for the covering vines with white plastic compared with the untreated vines (Table 6). As opposed to that, the untreated gave the lowest values in soluble solids content (SSC), SSC/acidity ratio, reducing sugars content and increased titratable acidity in berries in both seasons.

Plastic covering vines and mulching concentrate carbon dioxide surrounds the plant management as the planting holes act as vents for carbon dioxide escaping from beneath the mulch. The increased total soluble solids may have been caused by this unusually high carbon dioxide content. (**Sanders *et al.*, 1989**). The obtained results agree with those reported by **De Souza *et al.*, (2015),** they found that the lowest grape quality was observed from uncovered vines. This treatment uncovered the lowest total soluble solids and the highest tartaric acid as compared to covered vines. In the same line, **Abdel Elwahed *et al.*, (2015),** reported that plastic house treatment increased TSS% and decreased acidity in the berry juice of Thompson seedless grapevines. Moreover, **Salem *et al.*, (2021)** found that covering the vines significantly improved TSS and reduced sugar and anthocyanin contents and significantly decreased the total acidity, compared to uncovered grapes.

Table 6. Effects of plastic covering vines and mulching soil on berry chemical properties of 'prime Seedless' grapevines during 2018 and 2019 seasons

Characteristics / Treatments		Soluble solids content (SSC ◦Brix)		Total acidity (g tartaric acid /100 mL juice)		SSC/Acidity		Reducing sugars (%)	
		2018	2019	2018	2019	2018	2019	2018	2019
T1	Control	16	16.3	0.9	0.86	17.7	18.9	13.06	13.33
T2	Covering vines with white plastic	17.6	18	0.73	0.70	24.1	24.5	14.13	14.4
T3	Mulching soil with white plastic	16.3	16.6	0.86	0.83	18.9	20.0	13.06	13.33
T4	Mulching soil with black plastic	16.6	16.3	0.9	0.86	18.5	18.9	13.33	13.06
T5	Mulching soil with rice straw	16.6	17	0.83	0.82	20.09	20.5	13.33	13.6
L.S.D at 5%		0.87	1.49	0.08	0.07	2.43	2.76	0.89	1.19

Soil temperature

The effect of used plastic covering vines and mulching soil on differences of the soil temperature at three levels: at the soil surface, at 5 cm depth, and 20 cm depth during the 2018 and 2019 seasons are presented in Table 7. It is noticed that the mulching soil with black plastic treatment gave the highest value of soil temperature at the three depths compared with the other treatments and the other treatments were arranged in descending order as follows: mulching soil with white plastic > covering vines with white plastic > mulching soil with rice straw> and untreated in both seasons. Mulching has many advantages: it keeps balances the soil temperature and lower the maximum soil temperature, and raising the minimum soil temperature, (**Balota *et al.*, 2014**). Plastic covering vines and mulching soil increase is due to advantages such as increased soil temperature, moisture conservation, and more efficient use of soil nutrients **(Kasirajan and Ngouajio, 2012).** Also, **Gan *et al.* (2013)** stated that beneath a mulch layer, more hospitable soil microclimatic conditions are established, allowing soil temperatures to be decreased to a depth of 100 mm while preserving increased soil moisture throughout the hottest part of the growing season. **Aisha Gaser, *et al.*, (2017)** noticed that peas cover crop and clover cover crops gave increasing soil temperature at the three depths of the soil surface, at 5 cm depth and 20 cm depth.

Costs and net profit /feddan

It is clear from the presented data in Table (8) plastic covering and mulching soil of Prime Seedless grapevines gave the best net profit/ feddan as compared with control. In addition, covering vines with white plastic gave the highest values in net profit/feddan as compared with other treatments which recorded 40550 (L. E.) over control as average two seasons.

Table 7. Effects of plastic covering vines and mulching soil on soil temperature (soil surface, 20 cm and 30) cm of 'prime Seedless' grapevines during 2018 and 2019 seasons

Treatments \ Characteristics		soil surface (ºC)		5 cm depth (ºC)		20 cm depth (ºC)	
		2018	2019	2018	2019	2018	2019
T1	Control	22.9	23.48	18.18	18.52	15.70	15.89
T2	Covering vines with white plastic	24.9	25.7	20.13	20.36	17.23	17.23
T3	Mulching soil with white plastic	25.5	25.9	19.46	19.86	16.53	16.83
T4	Mulching soil with black plastic	26.4	26.7	20.5	21.3	17.8	18.13
T5	Mulching soil with rice straw	24.2	24.8	19.6	20.5	16.56	16.96
L.S.D at 5%		0.90	0.95	0.84	0.73	0.72	0.94

Table 8. Effect of covering vines and mulching soil on costs and net profit /feddan of 'prime Seedless' grapevines as average for two seasons (2018 and 2019)

Treatments		Costs of *cultural practices / fed. (L.E.)	Costs of hoeing weeds/ fed. (L.E.)	Treat. costs/fed. (L.E.)	Total costs / fed. (L.E.)	Yield/ fed. Kg	Price/1 kg from Yield	Total production /fed. (L.E.)	Net profit / fed. (L.E.)	Net profit /fed. over control (L.E.)
T1	Control	20100	2000	0	22100	7714	5	38570	16470	0
T2	Covering vines with white plastic	20100	2000	20000	42100	9912	10	99120	57020	40550
T3	Mulching soil with white plastic	20100	0	2750	22850	8309	6	49854	27004	10534
T4	Mulching soil with black plastic	20100	0	3000	23100	8540	6	51240	28140	11670
T5	Mulching soil with rice straw	20100	0	1500	21600	8652	5	43260	21660	5190

* Cultural practices such as (Fertilizers, Pesticides, fungicides, Irrigation and Labour without hoeing weeds)
- Costs of covering vines with white plastic 20000 (L.E.) / feddan
-Costs of mulching soil with white plastic 2750 (L.E.) / feddan
- Costs of mulching soil with black plastic 3000 (L.E.) / feddan
- Costs of mulching soil with rice straw 1500 (L.E.) / feddan
- One feddan = 700 vines
-The Price/1 kg from yield difference is due to the different timing of the harvest

Conclusion

It could be concluded that covering vines with white plastic to get the best results in early bud-burst, flowering and harvest time as well as to improve microclimatic, vegetative growth, yield and berry quality of 'Prime Seedless' grapevines.

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RESEARCH ARTICLE

Covering vines and mulching soil for improving of microclimatic, growth and fruit quality of prime seedless' grapevines

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Funding: NA

Ethics approval and consent to participate: Not applicable

Consent for publication: Not applicable

Competing interests

The authors declare that they have no competing interests.

Received: 2 Nov. 2022 **; Accepted:** 20 Dec.2022