SINAI Journal of Applied Sciences (ISSN: 2314-6079), Vol. (7), Is. (3), Dec. 2018 187-196

SINAI Journal of Applied Sciences

ARU-EGYPT SJAS Trust Science | It Creates

HYBRIDS VARIATION AND WHEAT STRAW MULCH EFFECTS ON VEGETATIVE GROWTH AND FRUIT YIELD OF SWEET PEPPER UNDER EL-ARISH AREA CONDITIONS

Eman A.G. Mohamed[*], S.A. Abo El-Kasem[1]; M.I. Mahmoud[2], and A.I. El-Kassas[2]

1. Dept. Self-Pollinated Veg., Inst. Hort., Cent. Agric. Res., Egypt.

2. Dept. Plant Prod., Fac. Environ Agric. Sci., Arish Univ., Egypt.

ABSTRACT

Field experiments were carried out during the two summer seasons of 2016 and 2017 at The Experimental Farm, Faculty of Environmental Agricultural Sciences, Arish University, North Sinai, Egypt to study the effect of mulch (without mulch and straw mulch) on two colored sweet pepper hybrids ("Yellow Star F1" and "Red Star F1", *Capsicum annuum* L.). Transplanting was carried out on 19thMay. Straw mulch was added after 10 days later. The experimental plot area was 15m^2 (15 m long and 1.0 m wide). Drip irrigation system was used. Each experimental plot had one dripper line, the distance between plants in the same row was 50 cm, which gave, planting density of 2.0 plants m^{-2}. Split -plot design with three replicates was used, where sweet pepper hybrids were randomly arranged in the main plots, and mulch treatments were randomly arranged in the sub plots. 'Red Star F1' hybrid recorded the highest values of plant height, number of leaves and leaf area as well as plant fresh and dry weight traits at 75 days after transplanting in both seasons. Red Star F1'and Yellow Star F1' both with mulch recorded the highest values of all vegetative growth traits and marketable yield traits in both seasons. Mulch treatment had higher values of all studied marketable yield traits (number of fruits/plant, mean fruit weight (g), and yield/plant (kg) in both seasons. Using straw mulch increased number of fruits/plant by 48.59% as compared to without mulch treatment. The highest values of all marketable yield traits in both seasons were recorded with 'Red Star F1' or 'Yellow Star F1' both with mulch.

Key words: Hybrids, mulch, marketable yield, sweet pepper.

INTRODUCTION

Sweet pepper is a high value crop and rich in vitamins, particularly provitamin a, vitamin B, vitamin C and minerals such as Ca, P, K and Fe (**Malik *et al.*, 2011**). It also contains thiamine, vitamin B6, beta carotene, and folic acid. It is grown for green, spices, condiments, sauces and pickles. During the growth stages of pepper, many unfavorable environmental conditions occur such as high temperature and high radiation in particular during summer season. These particular conditions may exert a negative effect on plant growth and yield (**López-Marín *et al.*, 2011**). In El-Arish region, irrigation depends on underground water with limited resources and high salinity. The main problem that influences fruit yield and quality of colored sweet pepper in summer season is the high solar radiation and high temperature. To overcome these problems it is necessary to protect plants from high solar radiation and high temperatures besides lowering water evaporation. Mulching aids in the control of temperature fluctuations (**Dilipkumar *et al.*, 1990**). Studies conducted by **Nkansah**

*** Corresponding author: Tel.:** +20167808391
E-mail address: emanadelsam95@yahoo.com

***et al.* (2003)** showed that organic mulches (grass straw, rice straw, rice husk and sawdust) were more effective in reducing soil temperature compared to the control. **Gandhi and Bains (2006)** reported that mulches moderate hydrothermal regime of the soil and modify the microclimate by modifying soil temperature. **Norman *et al.* (2011)** found that dry Panicum maximum grass and sawdust mulches reduced soil temperature.

Thakur *et al.* (2000) reported higher plant height and number of leaves of pepper under Lantana leaves and grass mulches compared to un-mulched treatments. Plant height was significantly higher with the application of *Glyricidia loppings* used as mulch over no mulch control plots. However, it was at par with application of crop residue mulch (grasses/plant materials/ weeds) as reported by **Venkanna (2008)**. Pepper plant height was significantly higher on grass mulch plots compared to the control (**Dauda, 2011**). In a pot on chilli plant experiment the greater number of leaves and plant height were recorded in rice straw mulch followed by wheat straw mulch and sugarcane bagasse mulch, while control plants recorded the lowest values (**Iftikhar *et al.*, 2011**). Mulches had significant primitive effects on root elongation. This might be due to the conservation of enough soil moisture, suitable soil temperature as well as suitable microclimate condition (**Norman *et al.*, 2011**).

Sugarcane bagasse mulch recorded the maximum pepper fruit length and width, followed by wheat straw mulch and rice straw mulch, while un-mulched treatment recorded the lowest one (**Iftikhar *et al.*, 2011**). Therefore, the objectives of this work were to evaluate the effect of organic mulch (wheat straw) on two colored sweet pepper hybrids for vegetative growth and fruit yield under El Arish conditions.

MATERIALS AND METHODS

Field experiments were carried out during the two summer seasons of 2016 and 2017 at The Experimental Farm, Faculty of Environmental Agricultural Sciences, Arish University, North Sinai, Egypt to study the effect of wheat straw mulch (without mulch and straw mulch) on two colored sweet pepper hybrids ("Yellow Star F1"and "Red Star F1" *Capsicum annuum* L.). Seeds were sown in plastic seedling trays on 28thMarch in both seasons. Transplanting was carried out on 19thMay. Straw mulch was added after 10 days later. The experimental plot area was 15m^2 (15 m long and 1.0 m wide). Drip irrigation system was used. Each experimental plot had one dripper line, the distance between the plants in the same row was 50 cm, which gave planting density of 2.0 plants m^{-2}.The physical and chemical analyses of the experimental soil and irrigation water are shown in Tables 1 and 2, respectively.

The experiment consists of two factors, the first factor was two sweet pepper hybrids "Yellow Star F1"and "Red Star F1" and the second factor was two types of mulch (without mulch and straw mulch). So, the experiment included the following treatments:

1. Yellow Star F1 + without mulch,
2. Yellow Star F1 + with mulch,
3. Red Star F1 + without mulch, and
4. Red Star F1 + with mulch.

The treatments were arranged in a split - plot design with three replicates, where sweet pepper hybrids were randomly arranged in the main plots, and mulch treatments were randomly arranged in the sub plots. The normal agricultural practices were carried out as commonly followed in El-Arish region.

Table 1. Initial physical and chemical properties of investigated soil of cultivated area.

Particles size distribution (%)		
	2016	**2017 seasons**
Coarse sand%	58.0	59.5
Fine sand%	19.8	19.3
Silt%	12.9	13.0
Clay%	9.3	9.3
Soil texture	Loamy sand	Loamy sand
Bulk density (Mgm^{-1})	1662	1661
Chemical properties soluble ions (in 1:5 soil water extract)		
Ca^{+} (meq^{-1})	3.90	3.90
Mg^{+} (meq^{1})	3.62	3.43
Na^{+} (meq^{-1})	2.54	2.59
K^{+} (meq^{-1})	0.34	0.32
$CO3^{-}$ (meq^{-1})	-	-
$HCO3^{-}$ (meq^{-1})	4.30	4.40
Cl^{-} (meq^{-1})	4.70	4.35
SO_4 (meq^{-1})	1.50	1.45
EC (dSm^{-1}) in 1:5 water extract)	0.08	1.02
PH (in1:2.5 Soil water suspension extract)	8.10	8.13
Organic matter (%)	0.153	0.171
CaCo 3 (%)	22.43	22.48

Table 2. Chemical composition of irrigation water.

PH	**ECm^{-2}**	**Soluble ions(me l-1)**							
		Cations				**Anions**			
		Ca++	**Mg++**	**Na+**	**K+**	**Cl-**	**$HCO3^{-}$**	**$CO3^{--}$**	**$SO4^{--}$**
First season (2016)									
7.55	5.93	20.50	16.80	18.50	0.24	45.92	2.90	-	7.22
Second season(2017)									
7.60	6.00	21.00	17.00	18.80	0.25	46.75	2.97	-	7.28

Data Recorded

Five plants from each experimental unite were randomly taken after 75 days from transplanting to determined plant height (cm), number of leaves, fresh and dry weights of plant. Leaf area was determined according to the method described by **Ackley (1964)**. Fruits of all pickings tell the end of the experiment were counted and weighed and the following data were calculated: a) marketable yield, b) un-marketable yield (physiological disorders, especially blossom end rot and sunscald fruits).

Statistical Analysis

The obtained data were subjected to statistical analysis of variance according to **Snedecor and Cochran (1980)**, and means separation was done according to **Duncan (1958)**. Mstat C program was used for analysis.

RESULTS AND DISCUSSION

Effect of Hybrid Variations

Vegetative growth

Table 3 Show significant effects for hybrids on plant height, number of leaves and leaf area as well as plant fresh and dry weight traits at 75 days after transplanting in both seasons. 'Red Star F1' hybrid recorded the highest values in all studied traits except number of leaves/plant in both seasons. The 'Red Star F1' was more responsible to microclimate conditions around the plant than 'Yellow Star F1', this was reflected on expression of genes and their stability under the same studied conditions.

Fruit yield

Results presented in Tables 4 and 5 indicate that hybrids had no significant effects on all total marketable yield traits, except fruit yield/m^2 in the second season. 'Red Star F1' cultivar recorded the highest values. However, hybrids had no significant effect on all un-marketable yield traits, except number of fruits/plant, and fruit yield/plant in both seasons (Table 5). 'Red Star F1' hybrid recorded the highest values in all studied traits in both seasons. Using straw mulch increased number of fruits/ plant by 48.59% as compared to without mulch treatment.The increase in fruit yield of "Red Star F_1" may be due to the increase in leaf area per plant which increased the accumulation of dry matter in pepper leaves that help in the flowering process, fruit set and composition of fruits, consequently caused increase in fruit yield.

Effect of Organic Mulch

Vegetative growth

Results in Table 3 show significant effects for mulch treatments on plant height, number of leaves, leaf area, as well as fresh and dry weight traits at 75 days after transplanting. The highest values were recorded with mulch treatment in both seasons. These results may be due to the effect of organic mulch that maintain soil moisture and consequently resulted in good conditions for plant growth under high solar radiation and high temperature besides the high water salinity, hence, resulted in the maximum vegetative growth (maximum plant height, number of leaves and leaf area).

In addition, results agree with the findings of many researchers with organic mulch on different vegetable crops. **Thakur *et al.* (2000)** reported higher plant height of capsicum under lantana leaves and grass mulches compared to un-mulched treatments. **Venkanna (2008)** observed increase in chilli leaf area and leaf area index under glyricidia mulch and crop residue mulch over no mulch treatment. **Dauda (2011)** found that the highest plant height and number of pepper leaves at 10 weeks after plating was significantly higher with grass mulch plots compared to the control. **Iftikhar *et al*. (2011)** observed that organic

Table 3. Effect of hybrid variations and mulch on plant height, number of leaves, leaf area, fresh and dry weight of sweet pepper plant at 75 days after transplanting in 2016 and 2017 seasons.

Treatment	Parameter	Plant height (cm)	Number of leaves/plant	Leaf area (m^2)	Plant fresh weight (g)	Plant dry weight (g)
			First season (2016)			
Hybrids	Yellow Star	63.25b	95.19a	23.73b	182.80b	51.35b
	Red Star	65.82a	90.89a	28.32a	199.05a	54.61a
Mulch	Without	60.77b	78.16b	21.189b	159.23b	46.54b
	With	69.30a	107.91a	30.87a	225.33a	95.38a
			Second season (2017)			
Hybrids	Yellow Star	72.03b	98.87a	20.70b	188.31b	58.34b
	Red Star	74.81a	94.10a	24.84a	204.95a	60.35a
Mulch	Without	65.27b	82.06b	19.98b	166.13b	49.64b
	With	75.57a	111.81a	25.57a	231.22a	65.05a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

Table 4. Effect of hybrid variations and mulch on marketable yield of sweet pepper in 2016 and 2017 seasons.

Treatment	Parameter	Number of fruits/plant	Mean fruit weight (g)	Yield/plant (kg)	Yield/m^2 (kg)
			First season (2016)		
Hybrids	Yellow Star	19.81a	143.87a	2.85a	6.33a
	Red Star	20.36a	154.21a	3.14a	6.97a
Mulch	Without	15.91b	136.42b	2.17b	4.81b
	With	23.63a	161.66a	3.82a	8.49a
			Second season (2017)		
Hybrids	Yellow Star	23.73a	149.99b	3.56a	7.91b
	Red Star	25.34a	160.19a	4.06a	9.02a
Mulch	Without	20.14b	142.48b	2.87b	6.37b
	With	28.38a	167.71a	4.76a	10.56a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

Table 5. Effect of hybrid variations and mulch on un-marketable yield of sweet pepper in 2016 and 2017 seasons.

Treatment	Parameter	Number of fruits/plant	Mean fruit weight (g)	Yield/plant (g)	Yield/m^2 (kg)
			First season (2016)		
Hybrids	**Yellow Star**	1.97b	95.99a	188.91b	0.42a
	Red Star	2.47a	94.05a	232.35a	0.52a
Mulch	**Without**	2.19a	92.47b	202.73a	0.45a
	With	2.24a	97.57a	218.54a	0.49a
			Second season (2017)		
Hybrids	**Yellow Star**	33.38b	101.18a	219.51b	0.49a
	Red Star	2.30a	103.04a	237.28a	0.53a
Mulch	**Without**	2.34a	99.66b	233.50a	0.51a
	With	2.14a	104.52a	223.31a	0.49a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

mulch materials maintain soil moisture and raise soil temperature and consequently resulted in the maximum number of leaves and leaf area of chilli plants grown in rice straw mulch produced by wheat straw mulch and sugarcane bagasse mulch. The minimum number of leaves was recorded by the control (no mulch). Also, **Norman *et al.* (2011)** found that sawdust mulch increased hot pepper plant height more than the control.

Fruit yield

Results in Tables 4 and 5 show significant effects fort mulch treatment with higher values of all studied marketable yield traits (number of fruits/plant, mean fruit weight (g), and yield /plant (kg) in both seasons. However, there were no significant differences for un-marketable yield at all studied traits in both seasons, except mean fruit weigh which recorded the highest values with mulch treatment in both seasons.

These results may be due to the effect of organic mulch that resulted in maximum vegetative growth reflected on good productivity of pepper plant. In this direction, many researchers among them, **Manuel *et al.* (2000), Thakur *et al.* (2000), Dauda (2011), Iftikhar *et al.* (2011) and Norman *et al.* (2011)** found that organic mulch had the highest fruit yield of bell pepper grown on mulch which produced higher total number and weight of fruits than those on bare soil.

Effect of the Interaction between Hybrid Variations and Organic Mulch

Vegetative growth

Results in Table 6 show significant effects for the interaction between cultivars ('Red Star F1'and Yellow Star F1') and mulch treatments on plant height, number of leaves, leaf area, and both of plant fresh and dry weight at 75 days after transplanting in both seasons. "Red Star F1" and "Yellow Star F1" both with mulch recorded the highest values of all vegetative growth traits without significant different between them at all sampling dates in both seasons.

Table 6. Effect of interaction between hybrid variations and mulch on plant height, number of leaves, leaf area, plant fresh weight and plant dry weight of pepper plant in 2016 and 2017 seasons.

Treatments	Parameters	Plant height (cm)	Number of leaves/ plant	Leaf area/ plant (m^2)	Plant fresh weight (g)	Plant dry weight (g)
Hybrids	**Mulch**		**First season (2016)**			
Yellow Star	**Without**	56.02b	80.09b	19.63b	151.16b	44.55c
	With	71.48a	110.33a	27.83ab	209.67a	7.66b
Red Star	**Without**	64.52b	76.24b	22.75b	167.31b	48.03c
	With	73.11a	105.55a	33.90a	235.81a	60.66a
			Second season (2017)			
Yellow Star	**Without**	26.48b	83.76b	20.32b	157.08b	50.01c
	With	30.51a	114.02a	29.89ab	218.56a	3.73b
Red	**Without**	26.31b	80.35b	24.63b	173.21b	53.91c
	With	30.88a	109.61a	34.04a	241.70a	68.00a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

This result may be due to that mulching soil may reduce water loss, therefore increase water available to plants, also, organic mulch reduce temperature on the surface soil, increase soil organic content and improve soil quality. These results are in agreement with those reported by **Thakur *et al.* (2000) and Norman *et al.* (2011)**.

Fruit yield

Results in Tables 7 and 8 show significant effects for the interaction between hybrids and mulch treatments on all studied traits. The highest values of all marketable yield traits in both seasons were recorded with 'Red Star F1' or 'Yellow Star F1' both with mulch. As regard to the un-marketable yield results showed no significant effects for the interaction between cultivars and mulch treatment on all studied traits, except weight and number of fruits per plant in both seasons. 'Red Star F1'with or without mulch and Yellow Star F1' with mulch recorded the highest values of fruits weight and number per plant in both seasons.

The increment in total yield may be owe to that mulch treatment regulate soil moisture and temperature which led to increases in crop production of pepper. Also, mulching increased nutrient uptake. Similar results were reported by many researchers (**Vos and Sumarni, 1997; Nkansah *et al.*, 2003; Gandhi and Bains, 2006**).

Table 7. Effect of interaction between hybrid variations and mulch on marketable yield of sweet pepper plants in 2016 and 2017 seasons.

Treatment	Parameter	Number of fruits/plant	Mean fruit weight (g)	Yield /plant (kg)	Yield/m^2 (kg)
Hybrids	**Mulch**		**First season (2016)**		
Yellow Star	**without**	13.69b	128.50b	1.76b	3.92c
	With	23.29ab	159.25a	3.71a	8.24a
Red Star	**without**	19.13b	134.34b	2.57b	5.79b
	With	24.01a	164.11a	3.94a	8.73a
			Second season (2017)		
Yellow Star	**without**	18.06b	133.97b	2.42b	5.37c
	With	28.34a	166.18a	4.71a	10.45a
Red Star	**without**	23.51b	141.19b	3.32b	7.38b
	With	28.58a	169.32a	4.84a	10.67a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

Table 8. Effect of interaction between cultivars and mulch on un-marketable yield of sweet pepper plants in 2016 and 2017 seasons.

Treatment	Parameter	Number of fruits/plant	Mean fruit weight (g)	Yield /plant (g)	Yield/m^2 (kg)
Hybrids	**Mulch**		**First season (2016)**		
Yellow Star	**Without**	1.89b	94.82a	179.12a	0.39a
	With	2.05b	97.15a	198.72a	0.44a
Red Star	**Without**	2.51a	90.11a	226.32a	0.53a
	With	2.43a	97.98a	238.42a	0.55a
			Second season (2017)		
Yellow Star	**Without**	2.32b	100.11a	232.12a	0.55a
	With	2.02b	102.33a	206.92a	0.46a
Red Star	**Without**	2.15a	109.01a	234.84a	0.52a
	With	2.47a	97.032a	239.75a	0.53a

Values having the same alphabetical letter(s) did not significantly differ at 0.05 level of probability according to Duncan's multiple range test.

REFERENCES

Ackley, W.B. (1964). Seasonal and diurnal changes in the water content and water deficit of Bartlett Pear leaves. Plant Physiol., 29:445-448.

Dauda B. M. (2011). Effects of grassed and synthetic mulching materials on growth and yield of sweet pepper (*Capsicum annuum* L.) in Mubi, Nigeria J. Agric. and Social Sci., 8: 97-99.

Dilipkumar, G.; Sachin, S.S. and Rajesh, K. (1990). Importance of mulch in crop production. Ind. J. Soil Conservation, 18: 20-26.

Duncan, D.B. (1958). Multiple Range and Multiple F test. 2nd Ed. McGraw-Hill, New York.

Gandhi, N. and Bains, G.S. (2006). Effect of mulching and date of transplanting on yield contributing characters of tomato. J. Res. Punjab Agric. Univ. India, 43 (1): 6-9.

Iftikhar, A.; Zahoor, H.; Shuaib, R.; Noor-Un-Nisa, M. and Summar, A.N. (2011). Response of vegetative and reproductive components of chilli to inorganic and organic mulches. Pak. J. Agric. Sci., 48 (1): 19-24.

López-Marín, J., González, A. and Gálvez, A. (2011). Effect of shade on quality of greenhouse peppers. Acta Hort., 893 : 895–900.

Malik, A.A.; Chattoo, M.A.; Sheemar, G. and Rashid, R. (2011). Growth, yield and fruit quality of sweet pepper hybrid SH-SP-5 (*Capsicum annuum* L.) as affected by integration of inorganic fertilizers and organic manures (FYM). J. Agric. Technol., 7: 1037-1048.

Manuel, C.P.; Allison, M.D. and Stafford, M.A.C. (2000). Comparison of organic and synthetic mulch for bell pepper production at three levels of drip irrigation. Proc. Fla. State Hort. Soc., 113: 234-236.

Nkansah, G.O.; Owusu, E.O.; Bonsu, K.O. and Dennis, E.A. (2003). Effect of mulch type on the growth, yield and fruit quality of tomato (*Lycopersicon esculentum* Mill). Ghana J. Hort., 3: 55-64.

Norman, J.C.; Opata, J. and Ofori, E. (2011). Growth and yield of okra and hot pepper as affected by mulching. Ghana J. Hort., 9: 35-42.

Snedecor, G.W. and Cochran, W.G. (1980). Statistical Methods 7th Ed. Iowa State Univ. Press. Ames. Iowa, USA.

Thakur, P.S.; Anju, T. and Kanaujia, S.P. (2000). Reversal of water stress effects 1.Mulching impact on the performance of *Capsicum annuum* L. under water deficit. Ind. J. Hort., 57 (3): 250-254.

Venkanna, Y. (2008). Studies on the effect of mulches, organics and organic solutions on growth, yield and quality of chilli (*Capsicum annum* L.) cv. 'Byadagi dabbi' in northern transition zone of Karnataka. M.Sc. Thesis, Dept. Agron., Coll. Agric., Dharwad Univ. Agric. Sci., Dharwad – 580 005.

Vos, J.G.M. and Sumarni, N. (1997). Integrated crop management of hot pepper (*Capsicum* spp.) under tropical lowland conditions. Effects of mulch on crop performance and prediction. J. Hort. Sci., 72: 415-424.

الملخص العربى

تأثير تباين الهجن وتغطية سطح التربة بتبن القمح على النمو الخضري والمحصول الثمري للفلفل الحلو تحت ظروف منطقة العريش

إيمان عبدالسلام جاب الله محمد، سامح عبدالحفيظ أبوالقاسم[٢]، محمود إبراهيم محمود[١]، وعلي إبراهيم القصاص[١]

١- قسم الإنتاج النباتي، كلية العلوم الزراعية البيئية، جامعة العريش، مصر.

٢- قسم الخضر ذاتية التلقيح، معهد بحوث البساتين، مركز البحوث الزراعية، مصر.

أجريت تجربتين حقليتين في الموسم الصيفي لعامي ٢٠١٦ و٢٠١٧م بالمزرعة البحثية لكلية العلوم الزراعية البيئية جامعة العريش، وذلك بهدف دراسة تأثير اثنين من هجن الفلفل (هجين الجيل الأول "يللوستار" وهجين الجيل الأول "رد ستار")، وتغطية سطح التربة بتبن القمح مقارنة بعدم التغطية على نمو وإنتاجية الفلفل الحلو تحت ظروف منطقة العريش بشمال سيناء. تم شتل النباتات في ١٩ مايو في الموسمين، وتم تغطية سطح التربة بعد ١٠ أيام من الشتل، كانت مساحة الوحدة التجريبية ١٥م^{٢} (١٥ متر طول، ومتر واحد عرض)، وبذلك يكون بكل متر مربع نباتين، تم استخدام نظام الري بالتنقيط، وكانت المسافة بين النباتات في الخط الواحد ٥٠ سم، تم استخدام نظام القطع المنشقة مرة واحدة في ثلاث مكررات، حيث تم التوزيع العشوائي للهجن في القطع الرئيسية، بينما تم التوزيع العشوائي لمعاملتي تغطية سطح التربة في القطع المنشقة، حقق الهجين "رد ستار" أعلى القيم لكل من ارتفاع النبات، وعدد الأوراق، والمساحة الورقية، والوزن الطازج والوزن الجاف للنبات بعد ٧٥ يوما من الشتل في الموسمين، نتج عن معاملة تغطية سطح التربة أعلى القيم لجميع صفات المحصول القابل للتسويق (عدد الثمار للنبات، ومتوسط وزن الثمرة بالجرام، ومحصول النبات الواحد بالكيلوجرام في الموسمين)، وقد نتج عن استخدام تغطية سطح التربة زيادة في عدد الثمار للنبات الواحد بحوالي ٤٨,٥٩% بالمقارنة بمعاملة عدم تغطية سطح التربة، وقد حقق كلا من الهجينين "يللوستار"، و"رد ستار" مع استخدام تغطية سطح التربة بتبن القمح أعلى القيم لصفات النمو الخضري وكذلك صفات المحصول القابل للتسويق في الموسمين.

الكلمات الاسترشادية: الهجن، وتغطية، تبن القمح، النمو الخضري، المحصول الثمري، الفلفل الحلو، ظروف منطقة العريش.

المحكمون:

١.أ.د. إيمان إسماعيل السراج أستاذ المحاصيل، كلية العلوم الزراعية البيئية، جامعة العريش، مصر.

٢.أ.د. أحمد محمود قنصـــوة أستاذ الخضر، قسم البساتين، محطة البحوث الزراعية بالقاهرة، مصر.