THE EFFECT OF COLOR PLASTIC MULCHES ON GROWTH, YIELD AND QUALITY OF TWO HYBRIDS OF SUMMER SQUASH *(CUCURBITA PEPO* L.)

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Abstract

This experiment was carried out at the vegetable research farm of Horticulture Department/ Faculty of Agriculture /Duhok University on two hybrids of summer squash during spring in the season of 2014, to study the effect of five color plastic mulches (without cover, transparent, black, red and blue) on two hybrids of summer squash (Amjed and Alexandra F1). The results showed that covers plastic mulches led to positive significant differences in leaf area (cm^2), leaves chlorophyll content%, , fruit number/plant, early yield and total yield as well as fruit weight (g), fruit length (cm) and fruit diameter (mm) as compared to without cover. There were no significant differences between the two hybrids in all detected traits. The interaction between covers plastic mulches and two hybrids was significantly enhanced all detected traits, since summer squash (Alexandra hybrid) covered with transparent plastic mulch were characterized by the highest values of leaf area (cm^2), leaves chlorophyll content% and fruit diameter (mm), and summer squash (Amjed hybrid) covered with blue plastic mulch gave positive significant of fruit number/plant and total yields ton/ hectare.

Keywords: *mulches, summer squash, hybrids*

Introduction

Summer squash (*Cucurbita pepo* L.) is one of the most important vegetable crops in Iraq especially during spring. In addition to cultivation in fall season in some areas it consists of annual crops including *cucurbitaceae* and Summer squashes are planted for its fruits, which are the edible parts of the plant after cooking. It has a medium food value due to some nutritional elements (P, Ca and Fe), and some vitamins (Matlob *et al*., 1989). Yield of summer squash per unit area is remained too low which is about (12.82 and 13.09 t/ha.) in 1999 and 2000 respectively (Annual Statistic Book, 2000), as compared to the world production.

To increase vegetable production, many applications such as coverage are used. Coverage vegetables can promote early yield and reduce fruit defects. However, coverage can reduce evaporation from the soil surface, prevent weed growth, raise soil temperature, reduce costs, reduce insect number and increase yield (Ekinci and Dursun, 2006). Polyethylene mulches benefit to adjust the soils microclimate in order to prolong the growing season and increase plant growth (Tarara, 2000). Black plastic mulch has intense shortwave transmittances and high shortwave absorption, which causes quickly increased soil temperatures (Heibner *et al*., 2005) white plastic mulch is prefers during the summer season in warm regions because white plastic maintain soil moisture and providing cooler temperature. Kasperhauer (1992) mentioned that red plastic increased yield in some crops, believed that it is generate a positive phytochrome response, found that improved yield quality due to used colored plastic (Brown and Channel-Butcher, 2001) This study aimed to determine the effect of different coverage Plastic color on growth, some quality properties and yield in two hybrids of summer squash.

Materials and Methods

The experiment was conducted at the vegetable research farm, Faculty of Agriculture, University of Duhok, on summer squash during spring season of 2014. Seedlings were growing in first of April 2014 at a distance 40 cm between plants and 1.5 m between the rows.

The experiment comprised the effect of two hybrids namely (Amjed and Alexandra), five coverage (without coverage, transparent, Black, Red and Blue). Each treatment was replicated three times. A replicate contained ten plants per one and was implicated in a completely randomized block design (RCBD). The soil was well softened, and then it was divided into rows and in this study all plants received the regular agricultural practices that usually carried out in the vegetable crops. Coverage was done before planting the seedling. Data were analyzed by using SAS program (SAS, 2001).

Experimental measurements

Three plants were selected randomly from each experimental unit to measure:

1-Vegetative growth characteristic

a-Leaf area (cm^2)

b-Leaf chlorophyll content%

2-Yield characteristic

a-Early yield: The first three harvests from each treatment were weighted to considered as an early yield**.**

b-Total yield: the total yield was measured by harvested all fruit from each treatment along the harvesting period were weighted to calculate the total yield Kg per plant and ton per hectare.

c- Fruit number per plant: Number of fruits per plant along the harvesting period was counted from each experimental unit, starting from the commence of harvesting and lasted to the end of the growing season and calculated**.**

3-Fruit quality:

five fruits from each treatments were randomly taken for determining average fruit character as follows:

a- Fruit fresh weight (g)

b- Fruit length (cm)

c- Fruit diameter (mm)

d- Fruit dry weight (gm).

Results and Discussion

Table (1) shows that transparent cover plastic mulch caused significant increase in leaf area (cm^2) as compared to without coverage and insignificant increase in Chlorophyll content %. As for there was no significant differences between its two hybrids on leaf area (cm^2) and Chlorophyll content %.

Concerning the effect of interaction between covers plastic mulches and hybrids observed that interaction between transparent cover and Alexandra hybrids was significant in its effect in leaf area (cm^2) and chlorophyll content% by the highest values of (317.20) cm^2 and (54.90) respectively. The increase in growth was attributed to sufficient soil moisture at the root zone and minimized the evaporation loss due to covers. The extended retention of moisture and availability of moisture also lead to higher uptake of nutrient for proper growth and development of plant. Similar findings have also been obtained by Dean Ban *et al*. (2004), Ansary and Roy (2005) in watermelon, Angrej-Ali and Gaur (2007) in strawberry, Aruna *et al*. (2007) in tomato.

Table (1) Effect of covers plastic mulches on leaf area (cm^2) and Chlorophyll content % of two hybrids of summer squash

covers	leaf area (cm^2)			Chlorophyll content %		
	hybrids		Covers effect	hybrids		Covers effect
	AM	AL		AM	AL	
without coverage	209.40bc	184.30c	196.8ob	50.93b	53.ooab	51.97a
White	302.60ab	317.20a	309.90a	53.23ab	54.90a	53.62a
Black	220.20a-c	252.80a-c	236.50b	54.00ab	52.67ab	53.80a
Red	234.70a-c	276.90a-c	255.80ab	52.63ab	53.33ab	52.98a
Blue	269.20a-c	237.30a-c	253.20ab	52.40ab	52.33ab	52.37a
hybrids effect	247.30a	253.70a		52.83a	53.07a	

Means within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Data presented in Table (2 and 3) are clearly shown that covers caused significant increases in all yield characteristics as compared with without coverage. In case of cultivars there was no significant increase in all yield characteristics.

The interaction between covers and hybrids was significant in its effect. since Amjed hybrid and blue cover were confined by highest value in fruit number/plant (29.00), total yield (4.50 kg/plant) and total yield (65.68 t/ ha) as compared with the lowest values of these traits for without covers which gave (17.33, 2.28kg/ plant and 33.36 t/ha) respectively and the interaction between red polyethylene and Alexandra hybrid gave by the highest value in early yield kg/plant as compared with without cover. Plant under polyethylene produced larger fruit and have higher yield per plant because of better plant growth due to favorable hydro-thermal regime and complete weed free environmental. Dickerson *et al.* (2003) reported earlier yield under plastic mulch. The above results were in agreement with those of Dean Ben *et al*. (2004), Ansary and Roy (2005), Cenobio *et al*. (2007), and Arancibia and Motsenbocker (2008) in watermelon.

Table (2) effect of covers plastic mulches on fruit number and early yield(kg) of two hybrids of summer squash

covers	Fruit number/plant			Early yield(kg)		
	Hybrids		Covers effect	hybrids		Covers effect
	AM	AL		AM	AL	
without coverage	17.33c	19.00c	18.17c	0.10de	0.08e	0.09c
Transparent	24.89ab	25.11ab	25.00b	0.47ab	0.48ab	0.48a
Black	26.89ab	24.22b	25.56b	0.32bc	0.27dc	0.29b
Red	25.11ab	26.00ab	25.56b	0.46a-c	0.52a	0.49a
Blue	29.00a	28.78a	28.89a	0.41a-c	0.34a-c	0.38ab
hybrids effect	24.64a	24.62a		0.35a	0.34a	

Means within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (3) Effect of covers plastic mulches on Total yield kg/plant and Total yield t/ha of two hybrids of summer squash.

Covers	Total yield Kg /plant			Total yield t/ha		
	Hybrids		Covers effect	hybrids		Covers effect
	AM	AL		AM	AL	
without coverage	2.28bc	2.71c	2.50b	33.36bc	39.60c	36.48b
Transparent	4.03a	4.39a	4.21a	58.80a	64.12a	61.48a
Black	4.08a	3.73ab	3.90a	59.52a	54. 56ab	57.04a
Red	4.16a	4.34a	4.25a	60.84a	63.36a	62.08
Blue	4.50a	4.42a	4.46a	65.68a	64.60a	64.32a
hybrids effect	3.81a	3.92a		55.64a	57.24a	

Means within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Data in Table (4 and 5) show that transparent cover plastic mulch had positive effect on fruit length (cm) and fruit diameter (mm) and no positive effect on fruit weight (g) and fruit dray weight (g). For the effect of hybrids there was no significant effect between two hybrids on fruit weight (g), fruit length (cm) and fruit dray weight (g).

Also the interaction between transparent covers plastic mulches and Amjed hybrid was high significant effect on fruit length (16.27cm) and fruit diameter (40.51mm) and the interaction between black cover and amjed hybrid give high significant effect on fruit weight (188.59g). Among all mulching treatment, maximum fruit weight was recorded in black cover. It appears that black polyethylene mulch have induced favorable conditions conducive to a attainment of fruits of higher weight. The highest fruit length was due to congenial soil moisture results higher uptake of nutrition for better growth of fruit, the reduction in evaporation losses of soil moisture caused by mulches covered the soil surface in row of summer squash. The above results were in agreement with those of Ansary and Roy (2004), and Arancibia and Motsenbocker (2008) in watermelon, Aruna *et al*. (2007) in tomato.

Table (4) Effect of covers plastic mulches on fruit weight (g) and fruit length (cm) of two hybrids of summer squash.

covers	Fruit weight(g)			Fruit length(cm)		
	hybrids		Cover effect	hybrids		Cover effect
	AM	AL		AM	AL	
without coverage	130.72b	142.51ab	136.61a	13.17b	12.86b	13.01c
Transparent	161.29ab	174.65ab	167.97a	16.27a	15.48ab	15.88a
Black	188.59a	153.11ab	170.85a	14.83ab	13.57b	14.20a-c
Red	165.63ab	166.16ab	165.89a	15.32ab	14.87ab	15.09ab
Blue	154.77ab	153.63ab	154.20a	14.04ab	13.15b	13.60bc
hybrids effect	160.20a	158.01a		14.73a	13.99a	

Means within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

Table (5) Effect of covers plastic mulches on fruit diameter (mm) and fruit dray weight (g) of two hybrids of summer squash.

Covers	Fruit diameter(mm)			Fruit dry weight(g)		
	hybrids		Covers effect	hybrids		Covers effect
	AM	AL		AM	AL	
without coverage	34.55a-c	29.86c	32.21c	3.68a	3.71a	3.70a
Transparent	40.51a	39.58a	40.05a	3.50a	3.94a	3.72a
Black	37.87ab	34.53a-c	36.20a-c	3.93a	4.28a	4.11a
Red	39.60a	36.32a-c	37.96ab	4.00a	3.86a	3.93a
Blue	35.56a-c	31.73bc	33.64bc	4.03a	4.24a	4.14a
hybrids effect	37.62a	34.40b		3.83a	4.01a	

Means within a column, row and their interaction following with the same latter are not significantly different according to Duncan multiple range test at the probability of 0.05 level

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تأثير التغطية بالبلاستيك الملون على نمو وحاصل ومكونات الحاصل لهجينين من القرع (*Cucurbita pepo* L.)

الخلاصة

اجريت هذه الدراسة في حقل الخضراوات التابع لفاكولتي الزراعة/جامعة دهوك على هجينين من القرع خلال موسم النمو ٢٠١٤ لدراسة تاثير التغطية بخمس الوان من البلااستيك (بدون تغطية ، شفاف، اسود، احمر،ازرق) على هجينين من القرع (أمجد وألكسندرا) اظهرت النتائج بان التغطية بالبلاستيك ادى الى اختلافات معنوية موجبة في المساحة الورقية (سم^{2}) والنسبة المؤية للكلوروفيل وعدد الثمار/نبات والحاصل المبكر والحاصل الكلي وكذلك وزن الثمرة (غم) وطول الثمرة (سم) وقطر الثمرة (ملم) مقارنة مع النباتات المزروعة بدون تغطية. ولم يظهر اختلافات معنوية بين الهجينين في جميع الصفات المدروسة . التداخل بين التغطية بالبلاستيك والهجينين شجع معنوياً جميع الصفات المدروسة، وتميزت نباتات القرع هجين (ألكسندرا) والمغطاة بالبلاستيك الشفاف باعطائها اعلى القيم في المساحة الورقية (سم^{2}) والنسبة المؤية للكلوروفيل و قطر الثمرة (ملم) و الهجين (أمجد) والمغطاة بالبلاستيك الازرق اعطى زيادة معنوية موجبة في عدد الثمار /نبات والحاصل الكلي طن/هيكتار.

كارتێكرنا نخافتنا نايلونێن رەنگاورەنگ ل سالوخەتێن كەسكاتیێ وبەرهەمی وپێكهاتییێن گولندی *Cucurbita pepo* L.)

پوختە

ئەف ڤەكولینە هاتە بجهئینان ل زەڤیێن چاندنیێ/ زانكویا دهوك ل سەر دوو جوریێن كولندا ل سالا ٢٠١٤ ژبو تاقیكرنا كارتێكرنا نخافتنا بینج جوریێن رەنگاورەنگ ییێن نایلونی (نەهاتیە نخافتن، روهن، رەش، سور، شین) ل سەر دوو جوریێن گولندی (امجد والكسندرا) ئەنجاما دیاركر كو نخافتن ب نایلونی جیاوازیا پێش جاڤ یا ئەرێنی هەبو لسەر روبەریێ بەلگا وچەنداتیا كلوروفیلی وژمارا فێقی/روەك وبەرهەمیێ زوی ویێ هەمیشەیی هەر وەسا كێشەیا فێقی(گم) ودرێژاهیا فێقی (سم) و تیرەیا فێقی (ملم) بەراوەردی دگەل ییێن نەنخافتی. ئو چ كارتێكرنێن پێش جاڤ دناڤبەرا هەردوو جوریێن گولندا ل سەر زوربەی سالوخەتان نەبوون .لێكدانێن دوو قولی دناڤبەرا نخافتنا نایلونی وجوریێن كولندا كارتێكرنێن پێش جاڤ هەبوون ل سەر زوربەی سالوخەتان، ددەمیێ بكارئینانا جوریێ كولندی (الكسندرا) و نایلونیێ روهن بوو ئەگەریێ زێدەبونێن پێش جاڤ ل روبەریێ بەلگا (سم٢) وچەنداتیا كلوروفیلی وتیرەیا فێقی (ملم) هەروەسا جوریێ كولندی (امجد) دگەل نخافتنا نایلونیێ شین زێدەكرنەكا ئەرێنی ل ژمارا فێقی/ روەك وبەرهەمی تەن/هكتار.