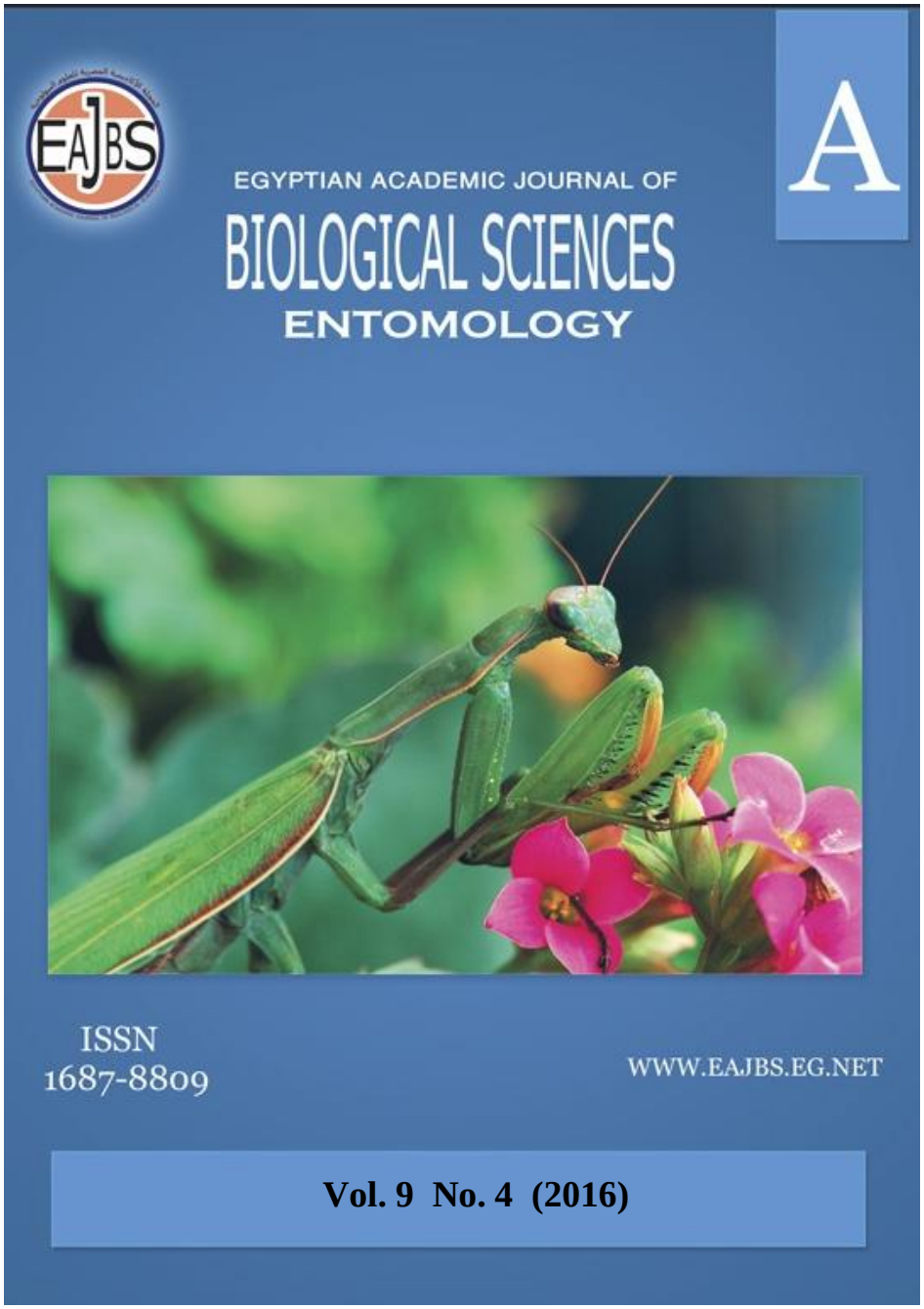

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Effect of Different Colors Mulch on Population Density of Some Pests Infesting Cucumber Plants and on Cucumber Yield.

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ABSTRACT

Field trial was conducted during two successive seasons on 2015 and 2016 at greenhouse experimental area, Dokki, Giza Governorate. This study aims to evaluating the efficiency of different colors mulch and some environmental factors on reduction of population density to the main sap-sucking pests infesting cucumber and yield. The trial were used five colors mulch to covering soil, i. e., red, green, blue, white, yellow and Control treatment without mulch. The results revealed that there are significant differences between using colors mulch with population densities of some pests the whitefly, *Bemisia tabaci* (Genn.), the thrips, *Frankliniella intonsa*(Trybom) and the spider mite, *Tetranychus urticae* (Koch). The tested mulch colors could be arranged according to population density of pests into six ecosystems. The red and white colors was the most potent treatments in low population pests in cucumber plants followed by blue, control, yellow and green which was the highest mean number of infestation in both seasons. Maximum and Minimum temperature were showed insignificant positive effect in first season but Minimum temperature was showed significant positive on *B. tabaci* (egg and nymph) during second season. Maximum and Minimum temperature were showed insignificant positive effect with *F. intonsa* and *T. urticae* (egg and immature) at the both seasons. The relative humidity had insignificant negative effect on *B. tabaci, F. intonsa* and *T. urticae* at the both seasons. The soil temperature had insignificant negative effect on *B. tabaci, F. intonsa* and *T. urticae* at the both seasons. The combined effect (E.V) of these ecological factors on *B. tabaci* (egg and nymph) , *F. intonsa* and *T. urticae* (egg and immature) showed that these factors were responsible as a group for 94 % , 79 %, 83, 89, 98, 87, 99, 99, 93, 95 effects on the population dynamics of pests throughout both seasons, respectively. Especially infestation pests - Yield relationship, the mulch colors affect 75% and 82% in yield weight both seasons.

Recommendation: the paper recommendation by cover soil surface with red and white mulch to reduce population of whitefly, thrips and red mite and increase yield.

INTRODUCTION

Cucumber, *Cucumis sativus* L. (Cucurbitaceous) is one of the most important vegetables, it is widely distributed all over the world. In Egypt, the cucumber plantation is progressing at a relatively fast rate especially in the new reclaimed area in open field and green house, fruit cucumber use for local consumption and exportation to the foreign markets.

However, cucumber plants in Egypt are subjected to infestation by many pests such Sap-sucking insect pests, whitefly; *Bemisia tabaci* (Genn); and cotton aphid; *Aphis gossypii* (Glov); onion thrips; *Thrips tabaci* (Lind) and two spotted spider mite *Tetranychus urticae* Koch are economically important pests on cucumber (*Cucumis sativus* L.) in different parts of the world (Baiomy, 2008). These insect pests are commonly encountered as a serious pests of various crops both in the open field and greenhouses (oliverira, 2001; Roll, 2004 and Alston, 2007). These pests make direct and indirect damage (Berlinger, 1986). Direct damage startups by sucking plant sap from the plant foliage, while Indirect damage due to the accumulation of honeydew that is considered as a good media for sooty mold growth, vectoring of plant viruses, so a few population of these pests is sufficient to cause considerable damage to the importance crops (Francki, 1979; Cohen and Berlinger, 1986; Berlinger, 1986; Conte, 1998; Devasahyam, 1998; Stansly *et al.*, 2004 and Baiomy, 2008). Different types of mulch affect on the vegetative growth and yield of cucumber plants through affect on soil temperatures which cause positive effect on the growth and yield of cucumber plants. The influence of polyethylene mulch type on soil temperature and crop response was dependent upon film color (Lippert and Witing, 1964). Wein and Minotti (1988), reported that plastic mulching increased total yield and shoot, compared with un-mulched plants. Concentrations of N, P, K, Ca, Mg, Cu and B an increase the soil temperature may interfere in the nutrient levels in plants. As the temperature rises, calcium and phosphorus tend to diminish while nitrogen and potassium tend to increase, as well as the growth or the aerial part of the plant (Teasdale and Abdul-bakla, 1995). The color of mulch determines its energy-radiating behavior and its influence on the microclimate around the plant. Black, transparent, and white mulches predominate in the commercial vegetable production today over the world (Lamont, 1993). Soil temperature can strongly influence root initiation, root growth and nutrient uptake, and subsequently impact shoot development and mineral nutrient accumulation of plants (Tagliavini *et al.* 1991, McMichael and Burke 1998). For many years, chemical insecticides have been used in a large and unwise scale for controlling agricultural pests. The increasing pests resistance against chemical pesticides, pollution of the ecosystem and other deleterious side effects on non-target organisms have initiated and favored the use of other agents to be incorporated into integrated control programs. To produce healthy vegetables and fruits must be free from insecticide to avoid human being health problems and also produce a save product. The present work was carried out as an attempt to investigate and suggest certain integrated pest management (IPM) aspects control pest on cucumber plant. This study aims to evaluating the efficiency of different colors mulch and some environmental factors on reduction of population density to the main sap-sucking pests infesting cucumber and yield.

MATERIALS AND METHODS

Experimental design and site:

Experiment was carried out at Dokki, Giza Governorate during two successive seasons 2015 and 2016, respectively for studying colors mulch - population density of insect pests relationship in open field. The experiment used five colors of mulch i.e. red, green, blue, white and yellow mulch while control treatment without mulched. Each of mulch colors experimental area was 63 m^2, divided into three replicates (replicates 1/200 per faddan), cucumber (Samara, variety) were sown on 17th Feb.

2015 and 2016, respectively. Each agriculture practices were carried out according to recommendation of Egypt agriculture ministry.

Sampling technique:

After three weeks for cultivation, chosen fifteen randomly leaves from different levels of plants and picked up per treatment then kept in tightly closed paper bags and transferred to the laboratory at the same day for examination and identify with the aid of a stereomicroscope. The sampling was taken 7 days intervals continued until 14 weeks for each treatment and evaluate total yield during fruit-set a long season. The total numbers were registered and the mean were calculated number of different pests on cucumber to study the effect of Maximum temperature, Minimum temp. ,Mean relative humidity (R.H %) and soil temp. on population dynamics of these pests, the simple correlation (r) and the partial regression (b) were calculated between each of the above mentioned factors (Xs) and the weekly mean numbers of these pests.

Analysis of variance (ANOVA) was performed on infesting pests and yield variables (SAS, 1999) and appropriate error terms for the F tests of interactions were calculated separately. Comparisons of means were performed using the Duncan's multiple range test (= 0.05).

RESULTS AND DISCUSSION

Effect of different treatments (colors mulch) on some pests infesting cucumber presented in Table (1,2). Referring the effect of different color mulch on pests during two successive seasons 2015 and 2016, respectively. Results of statistical analysis revealed that there are significant differences between using colors mulch with population densities of whitefly, *Bemisia tabaci* (Genn.) (Hemiptera: Aleyrodidae) , thrips, *Frankliniella intonsa* (Trybom) (Thysanoptera: Thripidae) and spider mite, *Tetranychus urticae* (Koch) (Trombidiformes: Tetranychidae). Whereas F value = 9.02 *** and L.S.D. = 231.22 individuals/210 leaves pests in the first season 2015 and F value = 7.54*** and L.S.D. = 253.29 individuals/210 leaves pests in the second season 2016. As well as, found significant between mean number of pests in both seasons whereas F value = 43.75***and L.S.D. = 231.22 individuals/210 leaves pests in 2015 and F value = 42.52*** L.S.D. = 216.11 individuals/210 leaves pests in 2016.

Whitefly, *Bemisia tabaci*.

Data in Tables (1 and 2) revealed that white and red colors mulch was the most superior treatment in low infestation with immature stages of whitefly (eggs and nymphs) during two successive seasons followed by blue mulch , control without mulch , yellow and green mulches which recorded the highest mean number in both seasons . The deposited number of eggs/ square inch, recorded 178, 238, 349, 363, 494 and 564 in case of red, white, blue mulches, control without mulch, yellow and green, respectively in the first season 2015, the same trend with nymph stage the results record 449, 510, 959, 1049, 1229 and 1265 by the treatment white, red, blue, control, yellow and green, respectively. On the other hand, the second season 2016, the results indicated that the whitefly egg recording 157, 251, 349, 432, 781 and 874 eggs/210 leaves in case white, red, control, blue, yellow and green, respectively, also same trend occur nymph stages, it was found that number of nymphs were 376, 449, 1120, 1121, 1338 and 1347 by the treatment white, red, blue, control, yellow and green, respectively.

Thrips, *Frankliniella intonsa*

Data tabulated in Tables (1and 2) indicated that white, red and blue colors mulch was the most potent treatment in low thrips nymph population on cucumber

leaves during two seasons followed by control, yellow and green whereas data recorded 114, 126, 130, 142, 144 and 155, respectively in the first season. As well as in the second season found 89, 102, 114, 120, 130 and 131, by the treatment white, blue, red, yellow, green and control, respectively.

Table 1: Effect of different colors mulch on mean number weekly of pests infesting cucumber leaves and total yield at Giza Governorate during season, 2015 in open field.

Mulch color	Air temperature			Average soil temperature	Whitefly		Thrips	Red spider		Mean	Total yield (Kg)
	Maximum temp.	Minimum temp.	Relative humidity		Egg no.	Nymph no.		Egg no.	Immature stage no.		
Red	26.43	14.86	57	20.95	238	510	126	821	749	488.8 d	804.13
White	22.57	13.43	60.71429	20.68	178	449	114	962	879	516.4 d	786.49
Yellow	26.57	14.57	54.71429	18.06	494	1229	144	1345	1432	928.8 ab	394.30
Blue	27.43	14.57	41.85714	20.52	349	959	130	998	1011	689.4 cd	465.63
Green	28.20	16.00	43.28571	17.44	564	1265	155	1890	1689	1112.6 a	368.24
Control	30.29	18.29	39.42857	24.30	363	1049	142	1215	1089	771.6 bc	681.21
Mean	26.91	15.29	49.50	20.32	364.3 c	910.16 b	135.16d	1205.2a	1141.5a		
Simple Correlation (r)						-0.891*	-0.757		-0.864*		
b						-1.89	-38.74		-1.83		
Coefficient of determination r^2						0.795	0.573		0.747		
F value						15.47*	5.37		11.78*		
E.V						79	59		74		

F value between mulch colors = 9.02*** sig. at 0.0001 L.S.D. = 231.22 individuals/ 210 leaves pests
F value between pests = 42.52*** sig. at 0.0001 L.S.D. = 216.11 individuals/ 210 leaves pests
F value between pests and yield = 12.66* sig. at 0.05 total Explained Variance (E.V.) = 75%

Table 2: Effect of different colors mulch on mean number weekly of pests infesting cucumber leaves and total yield at Giza Governorate during season, 2016 in open field.

Mulch colors	Air temperature			Average soil temperature	Whitefly		Thrips	Red spider		mean	Total Yield (kg)
	Maximum temp.	Minimum temp.	relative humidity		Egg no.	Nymph no.		Egg no.	Immature stage no.		
Red	26.57	17.00	43.00	31.86	251	449	114	1021	1055	478 cd	763.59
White	32.57	16.33	47.71	25.83	157	376	89	1001	1020	528.6 d	728.85
Yellow	35.71	20.43	43.86	20.34	781	1338	120	1320	1229	957.6 ab	368.50
Blue	33.60	19.00	53.33	19.84	432	1120	102	1650	1130	886.8 b	354.82
Green	30.86	20.71	40.71	25.33	874	1347	130	1790	1620	1152.2 a	336.92
Control	37.00	20.20	44.71	19.22	349	1121	131	1390	1143	826.8 bc	617.77
Mean	32.72	18.95	45.56	23.74	474 c	958.5 b	114.33 d	1362 a	1199.5 a	---	--
Simple Correlation (r)						-0.894*	-0.334		-0.685		
b						-1.54	-15.29		-2.35		
Coefficient of determination "r^2"						0.799	0.112		0.469		
F value						16.05*	0.50		3.99		
E.V						80	11		49		

F value between mulch colors = 7.54*** sig. at 0.0001 L.S.D. = 253.29 individuals/210 leaves pests
F value between pests = 43.75*** sig. at 0.0001 L.S.D. = 231.22 individuals/210 leaves pests
F value between pests and yield = 19.17* sig. at 0.05 total E.V = 82%

Red mite, *Tetranychus urticae*

In the same Tables (1and 2) show effect of colors mulch on eggs and immature stages of red mite, the results revealed that red and white mulch colors was the most potent treatment cause low number of infestation in cucumber plants from the red mite (eggs and immature stage) during two seasons followed by blue, control, yellow and green mulch which recorded highest in mean number both eggs and immature stages during experimental seasons. The laid eggs/ square inch recording 821, 962, 998, 1215, 1345 and 1890 in case of red, white, blue, control, yellow and green, respectively in the first examined season (2015), while in the immature stage found 749, 879, 1011, 1089, 1432 and 1689 when coverage the soli with red, white, blue,

control, yellow and green mulch, respectively in the first spray (2015). On the other hand, in the second season (2016), the results indicated that the red mite egg recording 1001, 1021, 1320, 1390, 1650 and 1790 when covering soil surface with white, red, yellow, control, blue and green, respectively. Also, in the same season (2016) immature stage the data record 1020, 1055, 1130, 1143, 1229 and 1620 with white, red, blue, control, yellow and green mulch, respectively.

The combined effect of some weather factors:

Whitefly, *Bemisia tabaci* :

Statistical analysis for the effects of the four selected weather factors (Max. temp., Min. temp., R.H% and Soil temp.) on the population dynamics of *B. tabaci* eggs and nymphs during both seasons at Giza Governorate are given in Table (3). These results revealed insignificant positive effects of maximum and minimum temperature on the seasonal fluctuations of *B. tabaci* eggs throughout in first season where “r” values were 0.572 and 0.369 during 2015, while in the second season found insignificant positive effects of maximum temperature but minimum temperature had significant positive effects where “r” values were 0.188 and 0.83 during 2016 for the two factors, respectively. While the mean percentages of relative humidity had insignificant negative effect in both seasons where “r” values = -0.524 and -0.432, respectively. as well as, the soil temperature revealed insignificant negative effect in both seasons where “r” values = -0.571and -0.302, respectively.

The combined effect (E.V) of these ecological factors on *B. tabaci* eggs showed that these factors were responsible as a group for 94 % and 79 % effects on the population dynamics of *B. tabaci* eggs throughout both seasons, respectively.

Also the effect of these factors both maximum and minimum temperature showed insignificant positive effects of maximum and minimum temperature on the seasonal fluctuations of *B. tabaci* eggs throughout in first season where “r” values were 0.675 and 0.482 during 2015, while in the second season found insignificant positive effects of maximum temperature but minimum temperature had significant positive effects where “r” values were 0.551 and 0.974 during 2016 for the two factors, respectively. While the mean percentages of relative humidity had insignificant negative effect in both seasons where “r” values = -0.658 and -0.140, respectively as well as, the soil temperature revealed insignificant negative effect in both seasons where “r” values = -0.371 and -0.693, respectively.

The percentage of the explained variances (E.V) for three selected ecological factors during both seasons were 83 % and 89 % effects on the population dynamics of *B. tabaci* nymphs for the both seasons, respectively.

Thrips, *Frankliniella intonsa*:

Statistical analysis for the effects of the three selected weather factors on the population dynamics of *F. intonsa* during 2015 and 2016 seasons were given in Table (3). These results revealed that maximum and minimum temperature had insignificant positive effects on seasonal fluctuation of nymph during both seasons where, "r" value were 0.743, 0.608, 0.176 and 0.801 for two factors, respectively. While the mean percentages of relative humidity had insignificant negative effect in both seasons where “r” values = -0.622 and -0.682, respectively as well as, the soil temperature revealed insignificant negative effect in both seasons where “r” values = -0.358 and -0.191, respectively.

The percentage of explained variances (E.V) for the three selected ecological factors during both seasons were 98 % and 87 % effects on the population dynamics of nymph of *F. intonsa* for the both seasons, respectively.

Red mite, *Tetranychus urticae*:

Statistical analysis for the effects of the three selected weather factors on the population dynamics of *T. urticae* during 2015 and 2016 seasons were given in Table (3). These results revealed that maximum, minimum temp., had insignificant positive effects on seasonal fluctuation of *T. urticae* egg during both seasons where "r" value were 0.408, 0.365, 0.268 and 0.782 for the two factors, respectively.

Table 3: Simple correlation and partial regression values of the four weather factors on some pests and corresponding percentages of explained variance on cucumber plants at Giza Governorate during 2015 and 2016 seasons.

Pests stage	Variables	2015					2016				
		Correlation		Regression coefficient		E.V%	Correlation		Regression coefficient		E.V%
		r	p	B	P		r	p	B	P	
B .tabaci **(Egg)**	**Max. temp.**	0.572	0.2	13.51	0.8	94%	0.188	0.7	499.05	0.9	79%
	Min. temp.	0.369	0.4	44.66	0.5		0.833	0.03	849.53	0.9	
	RH%	-0.524	0.2	-2.64	0.7		-0.432	0.3	255.40	0.9	
	Soil temp.	-0.571	0.2	-56.30	0.2		-0.302	0.5	643.35	0.9	
B .tabaci **(Nymph)**	**Max. temp.**	0.675	0.1	39.01	0.8	83%	0.551	0.2	23.47	0.9	89%
	Min. temp.	0.482	0.3	71.55	0.8		0.974	0.0008	300.45	0.9	
	RH%	-0.658	0.1	-12.81	0.7		-0.140	0.7	37.95	0.9	
	Soil temp.	-0.371	0.4	-101.61	0.4		-0.693	0.1	42.96	0.9	
F. intons **(Nymph)**	**Max. temp.**	0.743	0.09	1.64	0.6	98%	0.176	0.7	-64.26	0.7	87%
	Min. temp.	0.608	0.1	6.84	0.2		0.801	0.06	-77.61	0.8	
	RH%	-0.622	0.1	0.02	0.9		-0.682	0.1	-32.88	0.7	
	Soil temp.	-0.358	0.4	-5.02	0.1		-0.191	0.7	-78.01	0.8	
T.urticae **(Egg)**	**Max. temp.**	0.408	0.4	-167.49	0.1	99%	0.268	0.6	70.82264	0.01	99%
	Min. temp.	0.365	0.4	355.85	0.07		0.782	0.06	93.09509	0.01	
	RH%	-0.440	0.3	-22.18	0.1		0.042	0.9	34.66139	0.01	
	Soil temp.	-0.558	0.2	-183.26	0.04		-0.502	0.3	86.52452	0.01	
T. urticae **(immature stages)**	**Max. temp.**	0.374	0.4	-90.53	0.5	93%	-0.019	0.9	89.04	0.2	95%
	Min. temp.	0.259	0.6	236.68	0.3		0.714	0.1	88.77	0.2	
	RH%	-0.390	0.4	-15.25	0.5		-0.535	0.2	777.69	0.2	
	Soil temp.	-0.650	0.1	-164.27	0.1		-0.084	0.8	94.34	0.2	

Max. temp. = Maximum temperature
Min. temp.= Minimum temperature
R.H%= Relative Humidity

While the mean percentages of relative humidity had insignificant negative effect in first season where "r" value = -0.440, but in the second season had insignificant positive where "r" value = 0.042, respectively. as well as, the soil temperature revealed insignificant negative effect in both seasons where "r" values = -0.558 and -0.502, respectively.

The combined effect (E.V) of these ecological factors on T. urticae eggs showed that these factors were responsible as a group for 99 % and 99 % effects on the population dynamics of *T. urticae* eggs throughout both seasons, respectively.

Also the effect of these factors both maximum and minimum temperature showed insignificant positive effects on the seasonal fluctuations of *T. urticae* immature stage in the first season where "r" values were 0.374 and 0.259 during 2015, but in the second season showed insignificant negative effects of maximum temp., factor ("r" values was-0.019) but minimum temperature had insignificant positive effect ("r" values was 0.714). While the mean percentages of relative humidity had insignificant negative effect in both seasons where "r" values = -0.390

and -0.535, respectively. as well as, the soil temperature revealed insignificant negative effect in both seasons where "r" values = -0.650 and-0.084, respectively The percentage of explained variances (E.V) for the three selected ecological factors during the both seasons were 93 % and 95 % effects on the population dynamics of *T. urticae* nymphs for the both seasons, respectively.

These results are in agreement with those obtained by Younes *et al.* (2001) who detected significant negative correlation between the tested weather factors. and Jesus *et al.* (2009) observed a negative and nonsignificant linear correlation between average temperatures of whitefly number.

The infestation-yield relationship:

The effect of different treatments (color mulch) on cucumber total yield was presented in Tables (1 & 2) and Figs. (1& 2) for two successive seasons. Referring the effect using different colors mulch were significantly between pest population and weight yield. These values indicated that the three factors (pests), whitefly, *Bemisia tabaci* (Genn.), thrips *Frankliniella intonsa* (Trybom) and spider mite, *Tetranychus urticae* (Koch) were responsible percentage for 75% and 82%, respectively. Total Explained Variance ("E.V.") of variability in the average weight of crop yield in both seasons 2015and 2016, respectively.

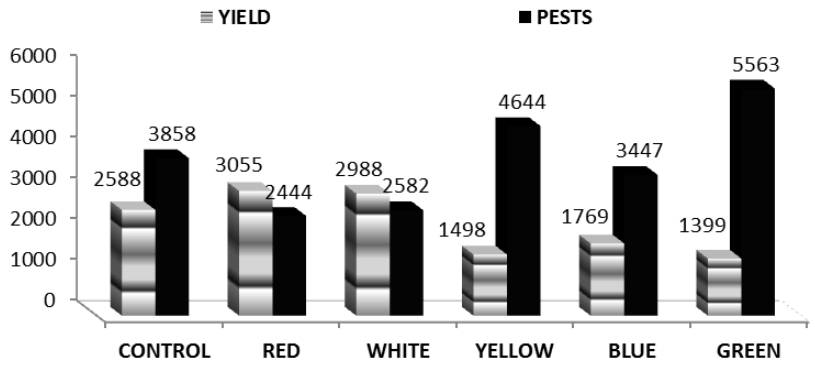

Fig. 1: Impact of color mulch on weekly mean number of pests infesting cucumber var. Samara and weight yield during 2015 at Giza Governorate.

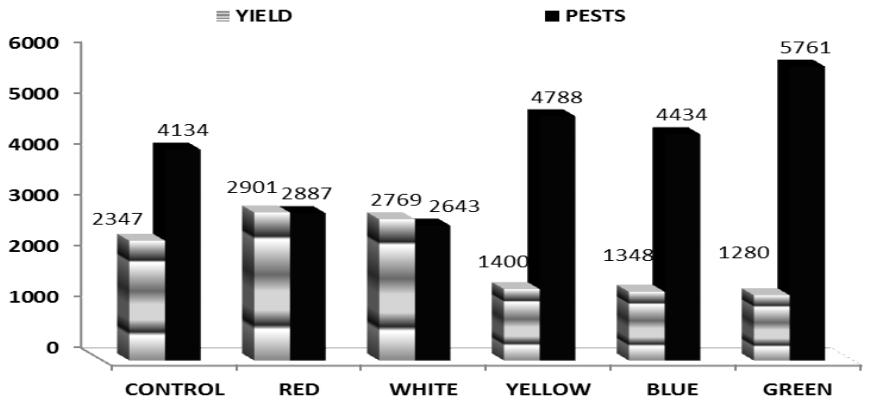

Fig. 2: Impact of color mulch on weekly mean number of pests infesting cucumber var. Samara and weight yield during 2016 at Giza Governorate.

Data in Figs. (1& 2) revealed that red, white and control mulch colors was the most potent treatment cause increasing weight of cucumber yield with low mean weekly number of the pests during the two seasons followed by blue, yellow and

green which record the highest mean number of pests in both seasons. whereas recording 804.13, 786.49, 681.21, 465.63, 394.30 and 368.24 Kg. by the treatment red, white, control, blue, yellow and green, respectively in the first examined season (2015) , while in the second season (2016), the results show 763.59, 728.85, 617.77, 368.50, 354.82 and 336.92 Kg. with the treatment red, white, control, yellow, blue and green, respectively.

Data in Tables 1&2 showed that the relationship between different colors mulch on population density of *B. tabaci* and crop yield of cucumber was negative and highly significant whereas "r" values were -0.891 and -0.894, while "b" values were -1.89 Kg and -1.54 Kg for two successive seasons 2015 & 2016, respectively. Coefficient of determination was 0.795 and 0.799 throughout two successive seasons 2015 & 2016, respectively. As well as the immature stage of *Tetranychus urticae* was negative and highly significant whereas "r" values were -0.864, while "b" values were -1.83 Kg and coefficient of determination was 0.75 for the first season 2015 but in the second season was insignificant.

The unit effect of infestation with single individual of pest on the crop yield of cucumber:

For calculation the loss of cucumber yield, the following equation was applied:

Reduction % = b/ $\bar{y}$ * 100

b= unit effect (regression value)

$\bar{y}$= the average mean yield / sample.

The results showed that one nymph of *Bemisia tabaci* caused reduction percentages of 13.28%, 13.28%, 26.49%, 22.43%, 28.37% and 15.33% in crop yield of cucumber followed by red, white, yellow, blue, green and control during 2015. Especially the second season, found that loss % were 11.14%, 11.67%, 23.1, 23.99, 25.26 and 13.77 with red, white, yellow, blue, green and control treatment, respectively.

The results showed that one immature of *Tetrenchys urticae* caused reduction percentages as follow 12.57%, 12.86%, 25.65%. 21.72%, 27.46% and 14.84% in cucumber yield in case of red, white, yellow, blue, green and control, respectively during 2015. While in the second season loss % increase compared with first season record 17.01%, 17.82%, 35.25, 36.61, 38.55 and 21.02 in transactions red, white, yellow, blue, green and control, respectively.

These results were in line with those obtained by (Lippert and Witing, 1964; Wein and Minotti. 1987; Teasdale and Abdul-bakla, 1995; Lamont 1993; Tagliavini *et al.* 1991; McMichael and Burke 1998, Abdrabbo *et al*. 2009 and Moses Mutetwa and Tuarira Mtaita. 2014).

CONCLUSION

The mulch using to grown cucumber in winter season has a significant effect on the growth and yield. The mulch colors have affect on pests population whereas decreased mean number of pests. The mulch red and white colors were the most efficiency colors compared control and other color mulch.

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ARABIC SUMMERY

تاثير الوان الاغطية المختلفة على الكثافة العددية لبعض الافات التى تصيب نباتات الخيار وعلى محصول الخيار

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تم أجراء التجربة الحقلية خلال موسمي الدراسة ٢٠١٥ , ٢٠١٦ في موقع الزراعات المحمية بالدقي , محافظة الجيزة . تهدف الدراسة لدراسة تاثير الالوان المختلفة للاغطية وبعض عوامل البيئية على خفض الكثافة العددية للآفات الثاقبة الماصة للعصارة التى تصيب نباتات الخيار وعلى إنتاجية نبات الخيار. استخدم فى التجربة خمسة الوان للاغطية هى الأحمر والأبيض والأصفر والأزرق والأخضر و المقارنة بدون غطاء. أظهرت نتائج التحليل الإحصائي وجود فروق معنوية بين استخدام الألوان المختلفة للاغطية على الكثافة العددية لبعض الآفات الذبابة البيضاء *Bemisia tabaci* Genn، التربس *Frankliniella intons*، العنكبوت الاحمر *Tetranychus urticae* . اظهرت النتائج ان الوان الاغطية ترتب وفقا للكثافة العددية للآفات إلى ستة انظمة الإيكولوجية ، حيث كان اللون الاحمر والابيض للاغطية اعلى تاثير على خفض تعداد الافات على نباتات الخيار يليه الأزرق، المقارنة ثم الأصفر والأخضر حيث سجلو أعلى متوسط لعدد الافات في كلا الموسمين.ولقد وجد تاثير كل من درجة الحرارة العظمى و الصغرى على حشرة الذبابة البيضاء (البيض و الحوريات) غير معنوى موجب فى الموسم الاول وايضا درجة الحرارة العظمى فى الموسم الثانى لها تاثير غير معنوى موجب بينما درجة الحرارة الصغرى لها تاثير معنوى موجب على البيض وحوريات الذبابة البيضاء فى الموسم الثانى، متوسط الرطوبة النسبية و درجة حرارة التربة تؤثر تاثير غير معنوى سالب على كل الافات محل الدراسة ونجد ان جميع العوامل المختارة توثر على الذبابة البيضاء (بيض و حورية) ، تربس الازهار، العنكبوت الاحمر كالتالى% 94 ، % 79،٨٣، ٨٩، ٩٨، ٨٧، ٩٩، ٩٩ ٩٣، ٩٥ على التوالى خلال الموسمين.

وبخصوص العلاقة بين الاصابة والمحصول كانت الاصابة لها تاثير على وزن المحصول بحوالى ٧٥٪ و ٨٢٪ في في كلا موسمين.

التوصية : يوصى البحث باستخدام الاغطية الحمراء والبيضاء لسطح التربة فى زراعات الخيار لخفض الاصابة بالذبابة البيضاء والتربس والعنكبوت الاحمر وزيادة المحصول .