ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Population Density of Whitefly *Bemisiatabaci* on Cauliflower.

Sawsan Kreem Flaih*.

Faculty of Agriculture Department of Plant Protection, University of Baghdad, Iraq.

ABSTRACT

This study was performed in vegetable farm at Women Science College/University of Baghdad. Two cauliflower varieties Nahar and Solid were grown and fertilized with Di-ammonium phosphate (DAP) and manure. Results revealed white fly individual incidence was higher on Nahar than solid variety. Whitefly rates were53.45 and 29.67 individual/leaf for Nahar and solid varieties, respectively with6.89 least significant difference value for whitefly rate.Whitefly incidence was higher on Nahar variety fertilized with manure when scored 54.45 compared to DAP with 49.91individual/leaf.The shared effect of variety and fertilizer type showed whitefly population density was higher in manure than DAP treatments. Solid showed better mechanical properties than Nahar variety may enhanced resistance, so that whitefly population density rate was lower.

Keywords: density, whitefly, cauliflower, *Bemisiatabaci.*

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Cauliflower *Brassica oleracea*a member of the family *Cruciferae* is ranked the first among other winter vegetables grown in Iraq. It probably originated in Cyprus (1).The edible part of cauliflower is the flower buds. It has a nutrition value as it lowers blood pressure, the risk of heart attack, cholesterol level and helps to controlblood sugar level and cancer diseases (12). Cauliflower is attacked by many pests worldwide, including cabbage aphid*Brevicoryne brassica*, cutworms *Agrotis*spp and whitefly *B.tabaci* (2). Whitefly is one of the most devastating pest worldwide. White fly damage on crops occurs through adults and nymphs feeding on plant sap, the toxic effect of saliva secreted into plant to enable food digestion and honeydew produced on leaves enables microorganisms and dusts buildup. Besides, honeydew can attract ants and confuse natural enemies. Whitefly infestation can cause yellowing and curling of leaves, shorten of plant age and reduce yield. The life cycle of white fly starts when females oviposit inside the mesophyll tissue at the lower surface of leaves. Eggs may be lied in clusters or individually. Number of eggs may reach up to 236 at 25 C°. When hatched, nymphs shortly are covered with a waxy secretion. Whitefly nymphs have four stages including pupal stage and 11-15 generations per year (8; 6). Plant resistance has been reported by many workers. (9) that genetic traits and features may affect host-pest relationship. (11) and (7) referred to two types of plant host defenses pets. The first is physical through trichomes and cuticle thickness. The second is chemical which affects pest behavior through attraction, repellence and growth regulation, (5).

MATERIAL AND METHODS

In growing season of 2016-2017, a field experiment was performed in vegetable farm at Women Science College/University of Baghdad. The experiment was designed in split plots according to Randomized complete block design (RCBD).The experimental field was divided into two parts with three replicates each. Then, each replicate was divided into 10 experimental units. Two rows of 8 m long were made for each experimental units. A 2m and about (60-80 cm) spaces were left between each raw and plant, respectively. Cauliflower seeds varieties Nahar and Solid were sown in a tray then one plant per hole was transplanted in field in 1/9/2016.

The application of fertilization treatment

Twenty five Kg per donum of triple superphosphate was divided into two portions and applied at the beginning of transplanting and 4 weeks after transplanting. It was added in lines 15 cm from plant stem (4).Manure fertilizer was applied similar to the chemical fertilizer.

The estimation of whitefly population density on cauliflower leaves during growing season

Ten leaves per week were collected in polyethylene bags from the two varieties then transferred into laboratory. Microscopic examination was performed to identify pests occurred in leaf samples. Other samples were stored in 1L plastic containers covered with Organza cloth and fixed by a rubber band. Whitefly adults and parasites were collected, preserved in 70% ethanol and sent to Iraqi natural history museum to confirm species identification.

Leaf area measurement:

Four leaves of each variety were weighted. Leaf dimensions were calculated using a grid paper. Each leaf was placed and outlined on a grid paper at leaf margins using a pencil. Actual leaf area was calculated by counting number of squares within the leaf drawing area. Proposed leaf area was calculated by multiplying the length and width of leaf blade measured by a ruler. The rate of difference in leaf surface area was measured to minimize the error percent.

RESULTS AND DISCUSSION

Results of whitefly population density showed a high incidence of whitefly individuals on Nahar variety which was 53.45 individual/leaf (table 1). Whitefly infestation on cauliflower started during the second week of November, 2016. Infestation rate scored 25.67 and 9.11individual/leaf on Nahar and Solid varieties, respectively. During cauliflower growing season, the infestation of insect fluctuated between 42.22-78.56 and

9.11-59.22 individual per leaf on Nahar and Solid varieties, respectively. Population density of whitefly scored 78.56 individual/leaf highest peak on Nahar variety in the last week of November, 2016. While it scored59.22highest peak on Solid variety was in the last week of October, 2016.Statistical analysis indicated presence of significant differences in whitefly incidence between the two varieties when least significant difference (LSD) value was6.890 at 0.05 probability value (P-value).Results obtained agreed with, (10) who indicated whitefly started to infest cauliflower at the beginning of growing season, gradually increased during crop growth stages and scored the highest population density at the end of November.

Table 1: Numbers of *Bemisiatabaci* individuals on Nahar and Solid varieties

variety	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/5	1/12	1/19	1/26	Average
Nahar	25.67	44.33	53.67	45.33	48.33	66.11	59.89	50.56	42.22	73.33	78.56	53.45
Solid	9.11	29.67	29.67	46.56	49.00	57.78	59.22	46.78	33.89	47.11	49.89	41.69
Average	17.39	37.00	41.67	45.94	48.67	61.94	59.56	48.67	38.06	60.22	64.22	47.57
LSD	6.890											

Results showed different rates of whitefly numbers between the two varieties fertilized with DAP and manure. In manure treatment experiment, the highest white fly number was scored on Nahar, with 54.45 individual/leaf. Whereas, it was 43.30individual/leaf for Solid (table 2).Compared to DAP treatment, whitefly population density was higher on plants treated with manure when scored 49.91 and 43.30 individual per leaf for Nahar and Solid varieties, respectively. While it scored 45.54 and 40.33individual/leaf for Nahar and Solid DAP treated plants, respectively compared to 56.00and 41.45individual/leaf for Nahar and Solid control treatment, respectively. LSD between the two varieties was 5.089 at 0.05 P-value. (10) Referred to the application of FYM fertilizer in IPM program to control cauliflower pests decreased pest population density. Similar results were obtained by, (3) when studying cucumber pests in Iraq.

Table 2: fertilizer effect against *B. tabaci* infesting the two varieties

Var.	Control	DAP	Manure	Average
Nahar	56.00	49.91	54.45	53.45
Solid	41.45	40.33	43.30	41.69
Average	48.73	45.12	48.88	47.57
LSD	5.089			

The combined effect of time and fertilizer type on population density of *B. tabaci* was investigated(Table 3). In manure, it was the highest at the end of October, 2016 when scored 63.83individual/leaf compared to control treatment with 18.67individual/leaf. Whereas the lowest was during the second week of November, 2016 when scored 18.67 individual/leaf. In DAP treatment, the highest population density was scored at the end of October, 2016 which was 63individual/leaf. The lowest was 13.67individual/leaf at the second week of November, 2016. No significant differences were noticed between time and fertilization as highest population density was recorded at the same dates for both varieties. LSD value was 11.93.

Table 3: The combined effect of time and fertilizer type on population density of *B.tabaci*

fertilization	11/16	11/23	11/30	12/7	12/14	12/21	12/28	1/5	1/12	1/19	1/26
control	19.83	44.17	44.00	44.50	50.67	60.00	58.50	45.83	40.00	62.67	65.83
DAP	13.67	30.00	38.00	46.00	43.67	61.67	59.00	50.00	34.67	56.67	63.00
Manure	18.67	36.83	43.00	47.33	51.67	64.17	61.17	50.17	39.50	61.33	63.83
Average	17.39	37.00	41.66	45.94	48.67	61.94	59.55	48.66	38.05	60.22	64.22
LSD	11.93										

Solid variety showed better growth properties (table 4) in fresh and dry weight, actual, proposed and pre-feeding leaf area in addition to other parameters. Solid variety, therefore, has better defense mechanism

system against whitefly infestation. While Nahar variety was highly sensitive and showed to be highly preferred for whitefly feeding.

Table 4: Some properties of the coefficient of correlation of *B. tabaci*

Replicate No.	Length	Width	Proposed leaf area	Actual leaf area	K factor	Pre-feedingarea	Fresh weight	Dry weight	Thickness
Nahar1	38	24.5	9.31	21	2.25	21	62.27	9.59	0.5
Nahar2	36	23	8.28	22	2.65	22	50.06	6.48	0.5
Nahar3	34	21.5	7.31	17	2.32	17	39.37	4.43	0.5
Nahar4	34	20.5	6.97	18	2.58	18	46.67	5.96	0.5
Solid1	44	22	9.68	22	2.27	22	52.93	3.81	0.5
Solid2	46	22	10.12	27	2.66	27	71.62	7.82	0.5
Solid3	48	30	14.4	35	2.43	35	15.67	8.71	0.5
Solid4	45	22	12.15	37	3.04	37	82.84	13.04	0.5
LSD	8.344	0.911	3.01	2.91	1.18	2.91	0.39	0.79	1.00

Table 5: Natural enemies reported on B. tabaci

Scientific name	Order	Family
Chrysopacarnea	Neuroptera	Chrysopidae
Eretmocers mundus	Hymenoptera	Aphelinidae

This study showed that there are vital enemies with this lesion.

REFERENCES

[1] Ahuja, I., Rohloff, J., Bones, A. M. 2010. Defence mechanisms of Brassicaceae: implications for plant-insect interactions and potential for integrated pest management. A review. INRA, EDP Sciences, 311–348.

[2] Al-Azzawi, A. F., Qadu,I. K. and Al-Haidari, H. S. 1990. Economic insects. Dar El Hekma For Printing & Publishing. Pp. 680.

[3] AL-Jorany, R., Flaih,S. K. andSalih, S. M. 2015. Population Density Importance of Cucumber *Cucumissativus* L. and Squash *Cucurbita pepo* Pests in Summer Season Agricultures. Egyptian Journal of Applied Sciences, Volume 30, Issue 5, Pp. 130-135.

[4] Al-Nuaimi, S. N. 1999. Fertilizers and Soil Fertility. University of Al Mosul . Ministry of Higher Education and Scientific Research.

[5] Dent,D. 2000. Insect Pest Management. CAB International. Pp.424.

[6] Jones, D. 2003. Plant viruses transmitted bywhiteflies. European Journal of PlantPathology 109: 197-221.

[7] Khan, S. M. 2011. Varietal performance and chemical control used as tactics against sucking insects pests of cotton. Sarhad J. Agric. Vol. 27, No.2, 255-261.

[8] Oliveira, M. R. V., Henneberry, T. J. and Anderson, P. 2001. History, current status, and collaborative research projects for *Bemisiatabaci*. Crop Protection. 20 (9): 709-723.

[9] Painter, R.H. 1951. Insect resistance in crop plants. MacMillan, New York, 520 pp.

[10] Sahito, H.A., Memon, S.A., Kaleri, N.H., Mal, B., Dhaunro, A.A. and Kaleri, S. 2012. Chemical treated IPM strategies for insect pests of cauliflower vegetable crop. International Journal of Agricultural Sciences .2 (1): 046- 053

[11] Smith, C. M. 2005. Plant resistance to Arthropods, molecular and conventional approaches. Kansas University, Manhattan, K S, U.S.A. 423 pp.

[12] Wikipedia Free Encyclopedia, 2016.