

RESEARCH PAPER

Diversity of Lepidopteron pests and assessing their infestation ratios and damages on cruciferous crops

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ABSTRACT:

A field research was conducted in the Grda Resha Research Station-College of Agricultural Engineering Sciences-Erbil-Kurdistan region-Iraq, to investigate the pestiferous lepidopteron associated with cruciferous crops and assessing the rate of their infestation at two different periods of crop age as well as estimating the damages caused by pestiferous insect complex in the field of crucifers including cabbage(varieties Zalal and Hanar), broccoli (varieties Ajas and Wisdom), and cauliflower (varieties Kasper and Organza), the experiment was carried out using RCBD design. The result showed that there are six pestiferous insects belonging to four different families within Order Lepidoptera including *Pieris rapae*, *Trichoplusia ni* (Hüb), *Pontia daplidice* (L.), *Hellula undalis* (Fabricius), *Plutella xylostella* (L.), *Pieris brassicae* (L.). the study displayed that the cabbage crop variety Zalal was the most preferable host plant and occupied the highest percentage of infestation by all pestiferous lepidopteron insects under the current study at both leaf and maturity stage and the same variety , also for damage occupation due to larvae of studied pestiferous lepidopteron insects which was occupied the highest damage percentage.

KEY WORDS: Assessment, Crucifers, Damage, Infestation, Lepidoptera, pest

DOI: <http://dx.doi.org/10.21271/ZJPAS.35.2.10>

ZJPAS (2023) , 35(2);86-93 .

1. INTRODUCTION:

Cabbages, broccoli and cauliflower are cruciferous crops belongs to family Brassicaceae, they are great economic and nutritional importance globally, and are fascinating due to their chemical composition which containing bioactive compounds(Favela-González *et al.*, 2020). They contain high levels of Anthocyanins which classified as strong (antioxidants)(Biesiada *et al.*, 2010).

In spite of their usefulness as food and other economic importance, there are numerous constraints in front of their productivity including major lepidopteron pests such as *Plutella xylostella* , *Pieris rapae* , *Pieris brassicae* , *Crociodomia binotalis*, *Hellula undalis* , *Diacrisia obliqua* Walker, *Spodoptera litura*, and *Helicoverpa armigera* (Shelton *et al.*, 2009), (Li *et al.*, 2021) and(Soth *et al.*, 2022).

And Flea beetles , Cabbage maggots (Andaloro *et al.*, 1983). The densities of lepidopteran larvae can reach levels that result in total destruction of leaves, leading to tremendous economic losses, since the larvae feed on the marketable portion of the crop (Philips *et al.*, 2014).

The objectives of this study were (i) to survey the pestiferous pests associated with cruciferous (ii) estimation of with their damage caused by lepidopteron larvae on three types of cruciferous crops in Erbil city.

2 Material and Methods:

2.1 Study design, cultivation and sampling:

This study was carried out in the Grdaresha research station belonging to College of agricultural engineering Sciences/Salahaddin University-Erbil-Kurdistan Region-Iraq during

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Article History:

Received: 11/08/2022

Accepted: 13/10/2022

Published: 20/04/2023

Cruciferous Growing Season, 2021-2022. three cruciferous crops . The varieties were (Zalal and Hanar) for cabbage, (Kasper and Organza) for Cauliflower and (Ajas and Wisdom) for Broccoli. were cultivated by transplanting one month age seedlings at -2021, and the treatments were allocated on line(plots) and blocks randomly using RCBD design (Randomized Complete Block design) . The phytophagous insects associated with cruciferous crops in the field were collected during the growing season by using Aerial Net and the immature stages were collected and brought to Laboratory for rearing until emergence of the adult stage in order to be identified.

sampling for infestation percentages was taken at two growing period ; first was at leaf stage one month after transplanting and the second was flower or head formation, of crop depending on the presence of larval stage on the plants, for this, the total number of plants contained in each of the three replications were checked for each crop varieties. Infestation percentage for each insect pest was worked out by using the following Formula (Equation 1)(El-Haleem *et al.*, 2019).

$$\% \text{infestation/Plot} = \frac{\text{no. of infested plants per plot}}{\text{total number of plants per plot}} \times 100 \quad (1)$$

For Estimation of damages on Cruciferous crop caused by lepidopteron larvae complex, at maturity phase, five randomly selected plants of each crop variety were brought to laboratory and then, the total weight of each head of cabbage and

Flower of Broccoli and Cauliflower were recorded and the plants head and flowers were reweighed after trimming the damaged parts of the plant due to larvae feeding (Ahmed *et al.*, 2018), afterward, the percent of losses for each plant was worked out by using the following Formula(Equation 2).

$$\text{Loss/Plant } \% = \frac{\text{weight before trimming} - \text{weight after Trimming}}{\text{weight of head or flower before Trimming}} \times 100 \quad (2)$$

2.2 Identification of Samples

The samples were collected separately and sent to Museum of plant protection department, Agricultural research center-Erbil for Identification .

2.3 Statistical Analysis:

The obtained data from the current study were tabulated and subjected to Excel program and the means were worked out and compared with each other using SPSS Program version 26(SPSS, 2018).

3 Results

3.1 Phytophagous insects associated with cruciferous crops

In the present study, six insects belongs to five genus and 4 families of order Lepidoptera (Table 1). were recorded associated with Crops belongs to family Brassicaceaeas shown in table (1),

Table (1) lepidoptera larvae collected from Cruciferous crops in Grdarsha field

No.	Common name	Scientific name	Family	Order
1	Small white butterfly	<i>Pieris rapae</i> (L.)	Pieridae	Lepidoptera
2	Large white butterfly	<i>Pieris brassicae</i> (L.)	Pieridae	Lepidoptera
3	Bath white butterfly	<i>Pontia daplidice</i> (L.)	pieridae	Lepidoptera
4	Cabbage webworm	<i>Hellula undalis</i> (Fabricius)	Crambidae	Lepidoptera
5	Diamondback moth	<i>Plutella xylostella</i> (L.)	Plutellidae	Lepidoptera
6	Cabbage Semilooper	<i>Trichoplusia ni</i> (Hübner)	Noctuidae	Lepidoptera

3.2 Infestation of cruciferous crops by main lepidopteron larvae

3.2.1 Infestation of Cruciferous crops by Diamondback moth:

The data provided in table (2) shows infestation percentages caused by Diamondback moth on cruciferous crops (Cabbage, Cauliflower and Broccoli) per plot, at two different period of growing life stage including leaf period and flower or Head formation stage in growing season-2021-2022.

the highest percentage of infestation caused by *P.xylostella* at leaf stage was ranged between (20-30%) with averaged $23.68 \pm 3.17\%$ plants/Plot on Cabbage crops, Zalal variety followed by variety Hanar for the same crop which occupied (15-20%) and averaged $17.22 \pm 1.46\%$ plants/plot, while the lowest percentage of infestation caused by Diamondback moth larvae was on Broccoli, Wisdom variety which ranged from 5 to 15% and averaged $10.00 \pm 2.88\%$ plants / plot, whereas, each of Broccoli (Variety Ajas), Cauliflower (Organza and Kasper varieties=)occupied the middle position, the infestation percentage were ranged from 10 to 15% and averaged $13.33 \pm 1.66\%$, $13.33 \pm 1.66\%$, and $13.51 \pm 1.49\%$

Table (2) Infestation of cruciferous crops by Diamondback moth during leaf and Flower/Head formation stage

Crops	Variety	Infestation percentage % / Plot			
		During leaf stage		During Heading/ Flower stage	
		Range	Mean \pm SE	Range	Mean \pm SE
Cabbage	Zalal	20-30	$23.68 \pm 3.17a$	42.11-50	$46.49 \pm 2.31a$
	Hanar	15-20	$17.22 \pm 1.46ab$	27.78-50	$35.18 \pm 7.40 b$
Broccoli	Ajas	10-15	$13.33 \pm 1.66b$	21.05-26.32	$23.19 \pm 1.59c$
	Wisdom	5-15	$10.00 \pm 2.88b$	21.05-27.78	$23.68 \pm 2.07c$
Cauliflower	Kasper	10.53-15	$13.51 \pm 1.49b$	22.22-26.32	$24.51 \pm 1.20c$
	Organza	10-15	$13.33 \pm 1.66b$	20-26.32	$22.84 \pm 1.85c$

Different letters in the same column are significantly different from each other at 0.05 SL., Duncan's test.

3.2.2 Infestation of Cruciferous crops by white Cabbage butterflies

The data provided in table (3) shows infestation percentages by cabbage white butterflies, *Pieris rapae* and *P. brassicae*, on cruciferous crops (Cabbage, Cauliflower and Broccoli) per plot, at two different times of growing life stage including leaf stage and flower or Head formation stage in growing season-2021-2022.

According to the data in table (3), the highest percentage of infestation caused by *P. xylostella* at leaf stage was ranged between (10-25%) and

plants / plot respectively, however at maturity stage, the highest infestation percentage of plants per plot was on cabbage crops (variety Zalal) which was 42.11-50% and averaged $46.49 \pm 2.31\%$ plants /plot followed by Hanar variety which averaged $35.18 \pm 7.40\%$ plants / plot and the lowest infestation percentage was recorded on Cauliflower(Organza variety)which was 20-26.32% and averaged $22.84 \pm 1.85\%$ plants / plot followed by Broccoli Ajas and Wisdom varieties) which were 21.05-27.78% and averaged $23.19 \pm 1.59\%$ and $23.68 \pm 2.07\%$ plants / plot ,however, cauliflower (Kasper variety)located at the middle by recording $24.51 \pm 1.20\%$ plants / plot.

Data statistically showed that there are significant differences between crops and Varieties at both growing stage data, especially between Cabbage (Zalal variety) and the rest of Studies crop varieties on the another hand ,the cabbage variety Hanar has significant difference with Zalal and cauliflower and broccoli varieties, otherwise, there are no significant differences among cauliflower and broccoli varieties.

averaged $16.93 \pm 4.3\%$ plants/Plot on Cabbage crops, variety Zalal followed by variety Hanar of the same crop which occupied (5-11.11%) and averaged $8.70 \pm 1.8\%$ plants/plot, while the lowest percentage of infestation caused by both species larvae was on Broccoli, variety Wisdom which ranged from 0.00-5.0% and averaged $3.33 \pm 1.6\%$ plants / plot, whereas, each of Broccoli (Variety Ajas), Cauliflower varieties Organza and Kasper occupied the middle position, the infestation percentage were ranged from 5 to 10% and averaged $6.66 \pm 1.6\%$, $6.66 \pm 1.6\%$, and $6.75 \pm 1.6\%$

plants / plot respectively for mentioned crop varieties above.

However, at maturity stage, the infestation ratios increased to nearly double of those recorded at leaf stage with some exceptions, the highest infestation percentage of plants per plot was on cabbage crops (variety Zalal) which was 15.79-22.22% and averaged $19.68 \pm 1.9\%$ plants /plot followed by Hanar variety which averaged $17.78 \pm 1.1\%$ plants / plot and the lowest infestation percentage was recorded on Broccoli variety Wisdom which was 5.56-10.53% and averaged $7.21 \pm 1.6\%$ plants / plot followed by Broccoli varieties Ajas which was 5.56-10.53% and averaged $8.87 \pm 1.6\%$ plants / plot, however, both varieties of cauliflower (Kasper and Organza) ranked at the middle by recording an

Table (3) Infestation of cruciferous crops by white butterflies at leaf and Flower/Head formation stage

Crops	Variety	Infestation percentage % / Plot			
		During leaf stage		During Heading/ Flower stage	
		Range	Mean \pm SE	Range	Mean \pm SE
Cabbage	Zalal	10-25	$16.93 \pm 4.3a$	15.79-22.22	$19.68 \pm 1.9 a$
	Hanar	5-11.11	$8.70 \pm 1.8 b$	16.67-20.00	$17.78 \pm 1.1 a$
Broccoli	Ajas	5-10	$6.66 \pm 1.6 b$	5.56-10.53	$8.87 \pm 1.6 b$
	Wisdom	0.00-5.0	$3.33 \pm 1.6 b$	5.56-10.53	$7.21 \pm 1.6 b$
Cauliflower	Kasper	5.0-10.0	$6.75 \pm 1.6 b$	5.56-15.0	$10.36 \pm 2.7 b$
	Organza	5.0-10.0	$6.66 \pm 1.6 b$	5.0-15.79	$10.36 \pm 2.7 b$

Different letters in the same column are significantly different from each other at 0.05 SL., Duncan's test.

3.2.3 Infestation of Cruciferous crops by cabbage webworm

The data shown in table (4) shows infestation percentages by cabbage webworm, *Hellula undalis* (Fabricius), on cruciferous crops (Cabbage, Cauliflower and Broccoli) per plot, at two different times of growing life stage including leaf stage and flower or Head formation stage in growing season-2021-2022.

The data in table (4) shows that the highest percentage of infestation caused by *H. undalis*, at leaf stage was on Cabbage crops, variety Zalal which ranged between (25.0-31.58%) and averaged $27.19 \pm 2.1\%$ plants/Plot followed by variety Hanar of the same crop which ranged (15.0-22.22%) and averaged $17.40 \pm 2.4\%$ plants/plot, while the lowest percentage of infestation caused by cabbage webworm larvae was ranged 10.0-15.0% and averaged $11.66 \pm 1.6\%$ plants / plot on each of Ajas , Wisdom and Organza varieties, whereas, Cauliflower variety

average of $10.36 \pm 2.7\%$ and $10.36 \pm 2.7\%$ plants / plot, respectively.

Based on the statistical analysis, according to Duncan test at 0.05 of significant level, there are significant differences between cabbage crop with other two crops (cauliflower and broccoli) and there is no significant difference between cauliflower and broccoli under the current study in terms of infestation percentage caused by both species of *P. rapae* and *P. brassicae* at both growing stage data, especially between Cabbage varieties (Zalal and Hanar) and with the rest of studied crop varieties, in contrast, there were no significant differences between cauliflower and broccoli crops and among their varieties.

Kasper occupied was ranged from 10.53-15.0% and averaged $13.51 \pm 1.4\%$ plants / plot. In contrary, at maturity stage, the data decreased to some extent in comparison to those recorded at leaf stage, the highest infestation percentage of plants per plot was on cabbage crops (variety Zalal) which was 15.79-26.32% and averaged $19.59 \pm 3.3\%$ plants /plot followed by Hanar variety which averaged $19.59 \pm 3.3\%$ plants / plot and the lowest percent of infestation was recorded on broccoli variety Wisdom which was 0.00-11.11% and averaged $5.55 \pm 3.2\%$ plants / plot, however, the remained varieties ranked at the middle by recording the range of 5.26-11.11%, 5.56-10.53%, and 5.56-10.53% and averaged $8.96 \pm 1.8\%$, $8.96 \pm 1.5\%$, and $8.96 \pm 1.5\%$ plants / plot for each of Ajas (broccoli), Kasper and Organza(cauliflower) respectively.

According to statistical analysis, cabbage crop variety Zalal showed a significant difference with all the rest of crops and varieties, and there was no significant difference among varieties of both

crops broccoli and cauliflower under the current study in terms of infestation percent due to cabbage webworm, *H. undalis* at leaf stage, while at maturity stage, besides the Zalal, the variety Hanar also differed significantly from the rest of

the studied crops and varieties, otherwise, no significant difference was found among varieties of both crops broccoli and cauliflower according to Duncan test at 0.05 of significant level.

Table (4) Infestation of cruciferous crops by Cabbage webworm at leaf and Flower/Head formation stage

Crops	Variety	Infestation percentage % / Plot			
		During leaf stage		During Heading/ Flower stage	
		Range	Mean \pm SE	Range	Mean \pm SE
Cabbage	Zalal	25.0-31.58	27.19 \pm 2.1 a	15.79-26.32	19.59 \pm 3.3 a
	Hanar	15.0-22.22	17.40 \pm 2.4 b	11.11-20.0	15.92 \pm 2.5 ab
Broccoli	Ajas	10.0-15.0	11.66 \pm 1.6 b	5.26-11.11	8.96 \pm 1.8 bc
	Wisdom	10.0-15.0	11.66 \pm 1.6 b	0.00-11.11	5.55 \pm 3.2 bc
Cauliflower	Kasper	10.53-15.0	13.51 \pm 1.4 b	5.56-10.53	8.96 \pm 1.5 bc
	Organza	10.0-15.0	11.66 \pm 1.6 b	5.56-10.53	8.96 \pm 1.5 bc

Different letters in the same column are significantly different from each other at 0.05 SL., Duncan's test.

3.2.4 Infestation of Cruciferous crops by cabbage semi-looper

The data provided in table (5) shows infestation percentages by cabbage semi-looper, *Trichoplusia ni*, on cruciferous crops (Cabbage, Cauliflower and Broccoli) per plot, at two different phases of growing life including leaf and flower or Head formation stage in growing season-2021-2022.

The data in table (5) displays that the highest infestation percentage caused by *T. ni* at leaf stage was between (5.26-15.0%) with average of 10.08 \pm 2.8% plants/Plot on Cabbage crops, variety Zalal followed by variety Hanar of the same crop which occupied (5.0-11.11%) and averaged 8.70 \pm 1.8% plants/plot, while the lowest infestation percentage due to larvae of cabbage webworm was on Broccoli, variety Wisdom which ranged from 0.00-5.00% and averaged 1.66 \pm 1.6% plants / plot, while, each of Broccoli (Variety Ajas), Cauliflower varieties Organza and Kasper occupied the middle rank by occupying the average of 3.33 \pm 1.6%, 3.33 \pm 1.6%, and 5.00 \pm 2.8% plants / plot for mentioned crop varieties, respectively. However, at maturity stage, the infestation data showed a slight increase in comparison to the data recorded at leaf stage, the highest infestation % of plants per plot was recorded on variety Zalal (cabbage crop) which ranged from 11.11 to 21.05% and averaged 15.98 \pm 2.8% plants /plot followed by Hanar variety(cabbage crop) which ranged 11.11-20.00% and averaged 15.92 \pm 2.5% plants / plot and the lowest infestation percentage was

recorded on Cauliflower variety Organza which was 0.00-5.56% and averaged 3.60 \pm 1.5% plants / plot followed by Broccoli varieties Wisdom and Ajas which were 0.00-11.11% and 0.00-10.53% and averaged 3.70 \pm 3.2% and 5.26 \pm 1.8% plants / plot for both mentioned varieties of broccoli respectively, in contrary, cauliflower variety Kasper located at the middle by recording 0.00-15.0% as a range and average of 8.51 \pm 1.5% plants / plot.

According to statistical analysis and Duncan test at 0.05 of significant level, there was a significant difference among crops and varieties under the current study in terms of infestation caused by *T. ni* at leaf stage data, especially between Cabbage variety Zalal and the rest of studied crop varieties which was highest preferable crop variety to infestation by *T. ni* and the broccoli variety Wisdom also has significant difference with Zalal and the rest varieties in the present study which was the least preferable host plant for infestation by *T. ni*, otherwise, there are no significant difference among cauliflower and broccoli variety Ajas and cabbage variety Hanar according to Duncan test at 0.05 of significant level. In contrast, at maturity stage, there was a significant difference between crops in general, while there was no significant difference between varieties of same crop except between Kasper and Organza.

Table (5) Infestation of cruciferous crops by cabbage semi-looper at leaf and Flower/Head formation stage

Crops	Variety	Infestation percentage % / Plot			
		During leaf stage		During Heading/ Flower stage	
		Range	Mean \pm SE	Range	Mean \pm SE
Cabbage	Zalal	5.26-15.0	10.08 \pm 2.8 a	11.11-21.05	15.98 \pm 2.8 a
	Hanar	5.0-11.11	8.70 \pm 1.8 ab	11.11-20.00	15.92 \pm 2.5 a
Broccoli	Ajas	0.00-5.00	3.33 \pm 1.6 ab	0.00-10.53	5.26 \pm 1.8 b
	Wisdom	0.00-5.00	1.66 \pm 1.6 b	0.00-11.11	3.70 \pm 3.2 b
Cauliflower	Kasper	0.00-10.0	5.00 \pm 2.8 ab	0.00-15.0	8.51 \pm 1.5 ab
	Organza	0.00-5.00	3.33 \pm 1.6 ab	0.00-5.56	3.60 \pm 1.5 b

Different letters in the same column are significantly different from each other

at 0.05 SL., Duncan's test.

3.2.5 Estimation of yield weight Losses due to lepidopteron insect pest complex

The data provided in table (6) explained that the highest percentage of head and Flower weight loss was recorded on the cabbage variety Zalal which ranged between 27.50 - 39.02% grams loss/Head, followed by Hanar variety which was ranged 20.67 - 24.83% and averaged 22.48 \pm 0.89% grams loss/Head, whilst the lowest percentage of damage due to (lepidopteron) larvae was recorded on broccoli variety Wisdom which was ranged from 8.32 to 11.54% grams loss/Flower, followed by broccoli variety Ajas which occupied a range of 8.32 - 11.94% and an average of 10.760 \pm 0.52%

Table (6) damages on cruciferous crops due to lepidopteran pest insect complex

No.	Crops	Variety	Weight loss % / plant	
			Range	Mean \pm SE
1	Cabbage	Zalal	27.50 - 39.02	31.346 \pm 1.98 a
		Hanar	20.67 - 24.83	22.48 \pm 0.89 b
2	Broccoli	Ajas	8.32 - 11.94	10.760 \pm 0.52 d
		Wisdom	8.32 - 11.54	9.862 \pm 0.59 d
3	Cauliflower	Kasper	14.78 - 19.05	17.304 \pm 0.76 c
		Organza	12.09 - 17.52	14.632 \pm 1.09 c

Different letters in the same column are significantly different from each other at 0.05 SL., Duncan's test.

4. Discussion

4.1 pestiferous insects associated with cruciferous crops

The pests that we recorded from this study (table 1) are supported by (Maltais *et al.*, 1998, Bhat, 2018) recorded the *Plutella xylosytella*, imported cabbageworm., *P. brassicae*, and, *Trichoplusia ni* on broccoli, and *Hellula undalis* has been

grams loss/Flower, however, cauliflower crop occupied the middle of position of damage occupation by recording a range of 12.09 - 17.52% and 14.78 - 19.05% and averages of 14.632 \pm 1.09% and 17.304 \pm 0.76% grams of loss/Flower for each of cauliflower varieties Organza and Kasper respectively.

According to DMRT at 0.05 level of significant, there was no significant difference between varieties of same crop; however, the crops differed significantly with each other in terms of damage occupation caused by lepidopteron larvae associated with cruciferous crops as an indication from Duncan test at 0.05 of significant level.

reported to be a pest insect on cruciferous crops (Hooks and Johnson, 2006), as well as *Pontia daplidice* was recorded as a pest insect on crucifers by (Bhat and Bhagat, 2009). However, other lepidopteron pests has been reported to a pest on brassicaceae crops included *Helicoverpa armigera* and *Agrotis ipsilon* (Bhat, 2018), *Crociodolomia binotalis* (L.), *Diacrisia*

obliqua Walker, *Spodoptera litura* F. (Shelton *et al.*, 2009).

4.2 Infestation of cruciferous crops by main lepidopteron pests

4.2.1 Infestation of Cruciferous crops by Diamondback moth:

Table (2) are in agreement with those of (Sarfraz *et al.*, 2006) who stated that the host plant nutritional quality, leaf morphology and leaf color, or a combination of these factors, may trigger reproductive and feeding activities of Diamondback moth (Badenes-Perez *et al.*, 2004) also observed that the variation in insect pest larval preference belong to diversity in host plants belonging to brassicaceae family. The findings also are in line with results of (Abro *et al.*, 1994) who found that the infestation by diamondback moth was higher on cabbage and cauliflower than on other host plants in their study and more preferable for feeding and population of larval stage.

4.2.2 Infestation of Cruciferous crops by white

Cabbage butterflies

Data in table 3, are in accordance with those of (Ali and Rizvi, 2007) They observed that the preference of white butterflies to cabbage is higher than to other cruciferous crops for development. Moreover, (Hwang *et al.*, 2008) mentioned that the variation in host plants phytochemical may play a key role which affects the performance of both species of cabbage white butterflies. Moreover, (Ketipaearachchi *et al.*, 1992) found that the population of *P. xylostella* on 30 days old cabbage plants was less than that on sixty days old plants.

4.2.3 Infestation of Cruciferous crops by cabbage webworm

The results in table (4) are in line with those of (El-Dabi *et al.*, 2006) who found that the population of cabbage webworm larvae was higher on cabbage than that on cauliflower by recording 43.3 and 55.9 larvae/ 25 plant on cabbage crop and 32.4 and 37.2 larvae / 25 plant on cauliflower crop, for two successive years respectively. In addition, (Ketipaearachchi *et al.*, 1992) found that the population of *H. undalis* on cabbage plants of 30 days age was lower than that on 60 days old.

4.2.4 Infestation of Cruciferous crops by cabbage semi-looper

The findings of the current study (table 5) are in agreement with those of (Singhamuni *et al.*, 2021) who found that the cabbage semi-looper T.ni preferred cabbage and knoll-khol to other tested host plants such as radish and mustard plants. the variation in data From both leaf and maturity stages and among various crops cultivated may belong to presence of biotic and seasonal conditions, and this supported by (Gaikwad *et al.*, 2018) who stated that the population of cabbage semi-looper increased in the 3rd Standard Meteorological weed. (Raja *et al.*, 2014) also mentioned that seasonal factors and beneficial insects play a significant role in the growth and development of individual insects as well as the population.

4.2.5 Estimation of yield weight Losses due to lepidopteron insect pest complex

The results of the present experiment (table 6) are reflected the findings of (Maltais *et al.*, 1998) who mentioned that these insects are major factors to reduce the yield of cruciferous crops by feeding on the marketable part on the crop or contaminating the edible proportion of the crop with their larval frass..

5 Conclusion:

The current study indicated that six pestiferous Lepidopteron insects were associated with the studied crops during the season and the Diamondback moth was the most abundant insect pest among lepidopteron insects, in this study it has been found that the infestation by studied pest insects was increased at the maturity stage in comparison with leaf stage, as well as, it was also appeared that the host preference by studied pestiferous insects were varied according to type of insects, crops and varieties.

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