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Estimating Economic Thresholds and Economic Injury Levels for *Schizaphis graminum* (Rond.) and *Sitobion avenae* Fab. Infesting Wheat Plants in Najaf Government, Iraq

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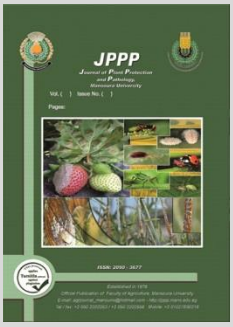

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ABSTRACT

Wheat (*Triticum aestivum* L.) is a vital cereal crop in Iraq and worldwide, but its productivity is threatened by cereal aphids, particularly *Schizaphis graminum* and *Sitobion avenae*. This study estimated the economic injury level (EIL) and economic threshold (ET) for both species during two successive seasons (2023–2024 and 2024–2025) in Najaf Governorate, Iraq. Caged experiments involved artificial infestations at early, mid, and late growth stages, with varying aphid densities ranging from 0 to 50 individuals per tiller . Grain weight and yield loss were estimated to determine those economic limits. Results showed that aphid density and infestation timing significantly influenced crop yield, with mid-season infestations of *S. graminum* and late-season infestations of *S. avenae* caused the greatest losses. In 2023–2024, the lowest EIL were recorded in mid infestations for *S. graminum* (4.886 aphids/feddan) and *S. avenae* (2.887 aphids/feddan). In 2024–2025, *S. graminum* showed the lowest EIL in mid infestation (0.46 aphids/kg), while *S. avenae* reached the lowest in late infestation (0.28 aphids/kg). These findings highlighted the necessity for plant stage-specific integrated pest management, prioritizing aphid control during the most susceptible growth phases to minimize economic losses. These thresholds provide a basis for optimizing control decisions while reducing unnecessary pesticide use.

Keywords: - Economic threshold. Injury level. *Sitobion avenae*, *Schizaphis graminium*

INTRODUCTION

Wheat, *Triticum aestivum* L. is ranked the first cereal crop for human nutrition in Iraq and over the world. Wheat grains are used for animal and poultry nutrition. Insect pests caused a great yield loss of wheat production. with cereal aphids caused yield reduction estimated to reach 23% (Pedigo, 1986; Tantawi 1985). Insecticidal control of insect pests of wheat has many risks, like disturbing the balance between aphids and bio-control agents (Smith *et al.*, 1985; El-Heneidy *et al.*, 2003) and accelerated development of insecticide resistance in aphid species (Shaoyou *et al.*, 1986). Therefore, Integrated Pest Management (IPM) program, where, utilizing all available tools and techniques to avoid the insecticide hazards to wheat crop and environment was highly needed.. IPM program will be more effective if it is based on realistic estimates, such as Economic Threshold (ET) and Economic Injury Level (EIL), of pest populations during different crop growth stages. EIL concept is the basis for decision-making in most pest management programs and aid for maintain environment through reduce unnecessary use of pesticide (Higley and Pedigo, 1993). EIL is defined as the lowest insect populations that cause economic damage. Several investigators in different parts of the world estimated the Economic Injury Level (EIL) and Economic Threshold (ET) (Kolbe and Linke, 1974; Kieckhefer *et al.* , 1995; Holz *et al.* 1994; Wetzel, 1995; El-Serafi, 1996; El-Heneidy *et al.* 2003 and Ghanim *et al.* 2018; Van Helden *et al.* 2022). However, these levels might be differed based on crop location, weather factors, variety of crop, and strain of insect. Therefore, this investigation aims to estimate the ETs and EILs for *Sitobion avenae* and *Shizaphis graminum* throughout different wheat developmental stages in Iraq.

MATERIALS AND METHODS

The present study was conducted at the Agricultural Research Institute (ARI) in Najaf Governorate (30.418°N, 45.41°E) during two successive winter wheat growing seasons (2023–2024 and 2024–2025). The experiment was carried out in an area of one feddan cultivated with the wheat cultivar Ebaa 99.

Estimating the Economic Thresholds and Economic Injury levels of two aphid species on wheat crop:

Using the methods of Ghanim and El-Adl (1983) and El-Serafi (1996), ten un-infested wheat tillers were placed in metal cages (0.5 m wide × 1.5 m high), each covered with muslin cloth to prevent the entry of other insect species and escaping the tested insects.

Specimens of *S. graminum* and *S. avenae* were collected upon their appearance in the wheat fields and reared under laboratory conditions. Artificial infestations were carried out at three different times: early-season infestation (15 January), mid-season infestation (19 February), and late-season infestation (5 March), using 0, 10, 20, 30, 40, and 50 aphids per tiller in each cage. Each treatment (infestation timing and density) were replicated three times. All

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agricultural practices were followed until harvest. At harvest, each

Grains produced from plants grown in each cage

was transferred to the laboratory, where 1000 grains were weighed to estimated yield loss. Alpha-Cypermethrin 10% was estimated using the recommended aphicide, at the rate of 30 ml /100 L. water. Calculations taken in account the costs of control measures, 2023 market price of the crop and average 3570 Kg /feddan. One feddan of wheat requires 400 litter water solution + 1 liter of Alpha-Cypermethrin 10%. Costs = 20000 IQD. To estimate the damage caused by artificially introduced populations of *S. graminum* and *S. avenae*, Economic Threshold, Economic Injury Level and Economic Yield Loss were determined as follows:

Economic Threshold Level (ETL):

The Economic Threshold was calculated based on formula proposed by Wetzel (1995):

$$\mathbf{ETL} = \frac{cc}{cp} \times 10$$

Where:

cc= Cost of implementing control measure.

cp= Cost of the increasing rate of yield.

Economic Injury Level (EIL):

The Economic Injury Level (EIL) was estimated based on the following parameters: the rate of yield reduction per aphid, aphid population density, cost of control measures, and the market price of the wheat crop. The EIL was calculated using the generalized formula proposed by Pedigo *et al.* (1986):

$$\mathbf{EIL} = \frac{C}{V \times D \times K}$$

Where:

- **C = cost of control per unit area**
- **V = market value per unit of yield**
- **D = yield loss per unit number of insects**
- **K = Effectiveness of control measures**

Economic Yield Loss:

The Economic Yield Loss was estimated according to the formula of Wetzel *et al.* (1980).

$$\mathbf{yr = (yc - yt / yc) \times 100}$$

Where:

yr = Loss in the yield due to pests.

yc = The yield in control (in the absence of the insects).

yt = the yield in the presence of insects.

Statistical analysis:

All statistical analyses were performed using GraphPad Prism (version 9.4.1, GraphPad Software, San Diego, CA, USA).. The regression relation between aphid density and grain weight at different infestation densities was determined. The significance level of $p < 0.05$ was considered statistically significant. Graphs were generated using GraphPad Prism.

RESULTS AND DISCUSSION

Data arranged in Table (1) reveal that the mean weight (in grams) of 100 wheat grains infested with *S. graminum* under different infestation rates (0, 10, 20, 30, 40, and 50 aphids per plant) during three infestation periods (early, mid, and late season) of 2023/2024 season. The grain weight consistently declined as aphid density increased across all infestation timings. During early infestation, the grain weight dropped from 5.43 g at 0 aphids to 5.10 g at 50 aphids. In mid-infestation, the reduction was more severe, decreasing from 5.43 g to 4.75 g, while in the late infestation a decline from 5.43 g to 4.79 g was reported. Therefore, there was a negative relation between aphid infestation and grain weight regardless the time of infestation, however the mid-season infestations caused the highest reduction.

Results arranged in Table (1) presented how different infestation levels and timing affect wheat grain weight. The infestation levels are categorized into six groups (0, 10, 20, 30, 40, and 50), representing the number of aphids per plant, while the infestation timing is divided into three stages: early, mid, and late infestation in the second season 2024/2025.

Across all infestation timings, the weight of 100 wheat grains decreased as the infestation level increased. This trend suggests a negative correlation between aphid infestation and grain weight. In the early infestation group, grain weight decreased from 5.72 grams (no infestation) to 5.36 grams at the highest infestation level (50). A more pronounced reduction is observed in the mid-infestation treatment, with grain weight declining from 5.72 grams to 5.03 grams, indicating that mid-season infestations had a stronger detrimental impact. Interestingly, in the late infestation treatment, while there was still a decline in grain weight from 5.72 to 5.41 grams, the reduction was comparatively less severe than in mid infestation, especially at higher infestation levels (40 and 50).

Overall, the table demonstrated that the timing and severity of *S. graminum* infestation significantly influenced wheat yield. Mid-season infestations at higher levels appeared to be the most damaging, followed by early infestations, while late infestations had the least impact, possibly due to the crop reached more advanced developmental stages that are less susceptible to damage.

Table 1. Mean weight of 100 wheat grains infested with *Schizaphis graminum* under varying levels of infestation in two successive seasons 2024/2025

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
0	5.43	5.43	5.43	5.72	5.72	5.72
10	5.4	5.31	5.32	5.68	5.58	5.67
20	5.34	5.28	5.23	5.62	5.56	5.63
30	5.31	5.12	5.19	5.59	5.39	5.63
40	5.13	4.95	4.86	5.39	5.2	5.45
50	5.1	4.75	4.79	5.36	5.03	5.41

Results obtained in Table (2) show that the percentage of weight loss in wheat grains infested with *S. graminum* under varying infestation levels (0, 10, 20, 30, 40, and 50 aphids per plant) and at different infestation timings (early, mid, and late) during the 2023/2024 season. The data reveal a progressive increase in weight loss percentage with rising aphid densities in all infestation periods. In early infestation, weight loss rose from 0% (control) to 6.15% at 50 aphids, showing a modest but steady impact. Mid infestation exhibited the most pronounced effect, with losses ranging from 0% to 12.67%, indicating a nearly double impact compared to early infestation. Late infestation also showed significant losses, increasing from 0% to 11.86% at the highest aphid density. Overall, the mid-infestation period resulted in the greatest percentage of grain weight loss, followed closely by late infestation, suggesting that aphid attacks during these stages pose a more severe threat to wheat yield. These findings underline the critical need for timely pest control, particularly during the mid-growth stage, to prevent substantial economic losses.

Results in Table (2) displayed the percentages of weight loss in wheat grains infested with *S. graminum* at different infestation levels (0 to 50) and infestation timings (early, mid, and late) during the 2024/2025 season. The data showed a clear increase in weight loss percentage in high infestation levels, with mid infestation caused the most severe losses. At the highest infestation level (50), mid infestation resulted in a 12.06% weight loss, compared to 6.29% and 5.42% for early and late infestations, respectively. While early infestation showed a gradual increase in weight loss from 0.70% at level 10 to 6.29% at level 50, late infestation had generally lower percentages, with minimal change beyond level 20. This indicates that the timing of aphid attack significantly affects the extent of grain weight reduction, with mid-season infestations being the most damaging, possibly due to their interference with critical phases of grain development.

TAable 2. Percentages of weight loss on wheat grains infested with Schizaphis graminum under varying levels of infestation in two successive seasons 2024/2025.

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
	0	0	0	0	0	0
10	0.59	2.32	2.06	0.7	2.45	0.87
20	1.77	2.8	3.68	1.75	2.8	1.57
30	2.28	5.75	4.53	2.27	5.77	1.57
40	5.67	8.95	10.53	5.77	9.09	4.72
50	6.15	12.67	11.86	6.29	12.06	5.42

Table (3) presents the Economic Injury Level (EIL) and Economic Threshold (ET) of *S. graminum* under early, mid, and late-season infestation, based on regression equations relating aphid density to 100-grain weight loss in the first season 2023/2024. The mid infestation period showed the greatest impact, with the steepest negative slope (-0.01274), indicating the highest yield loss per aphid (9.096 kg/feddan), compared to early (5.153 kg) and late (2.121 kg) infestations. Consequently, the mid period had the lowest EIL (4.886 aphids/feddan) and ET (3.91 aphids/feddan), highlighting the critical need for timely intervention during this stage. In contrast, late infestation resulted in a higher EIL (20.952) and ET (16.76), reflecting reduced economic damage per aphid.

Table (3) demonstrated that the Economic Injury Level (EIL) and Economic Threshold (ET) for *S. graminum* vary across different infestation periods during the second season 2024/2025, reflecting the crop's sensitivity to aphid attacks over time. The EIL is lowest in the Mid period (0.46 aphids/kg), indicating that even a small aphid population can cause economically significant yield losses at this stage, while higher thresholds are observed in the Early (0.81 aphids/kg) and Late (0.83 aphids/kg) periods. Correspondingly, the ET values, which signal the need for initiating control measures before economic damage occured, are also lowest in the Mid period (0.37 aphids/kg) compared to 0.65 and 0.66 aphids/kg in the Early and Late periods, respectively. These findings highlight the heightened vulnerability of the crop to aphid infestation during the Mid growth stage and underscore the need for timely monitoring and intervention during this critical period.

Table 3. Regression relationship between varying aphid infestation levels and wheat grain weight, Economic Threshold and Economic Injury Level at different infestation periods of *Schizaphis graminium* in two successive seasons 2024/2025.

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
Regression	y = -0.007217*x + 5.465	y = -0.01274*x + 5.466	Y = -0.002971*x + 5.421	Y = -0.007669*X + 5.751	Y = -0.01354*X + 5.751	Y = -0.007531*X + 5.745
Economic yield loss per aphid/kg	5.153	9.096	2.121	5.48	9.67	5.38
Economic injury level (EIL)/aphids	8.625	4.886	20.952	0.81	0.46	0.83
Economic threshold/aphids (ET)	6.90	3.91	16.76	0.65	0.37	0.66

The results obtained in Table (4) indicated that the mean weight of 100 wheat grains infested with *S. avenae* under different infestation levels (0 to 50 aphids) and infestation timings (early, mid, and late) during the first season of 2023/2024. Across all infestation times, grain weight consistently decreases as the number of aphids increases. For early infestation, the weight drops from 5.434 g at 0 aphids to 5.296 g at 50 aphids. The reduction is more pronounced during mid infestation, decreasing from 5.434 g to 4.566 g, and most severe in late infestation, with a drop from 5.434 g to 4.318 g. This trend indicates that not only the level of infestation but also the timing of aphid attack significantly influences grain yield, with late infestations causing the greatest reductions, likely due to interference during critical grain filling stages.

The results arranged in Table (4) presented the impact of aphid infestation on grain weight across different infestation timings and intensity levels in the second season 2024/2025. At all infestation times Early, Mid, and Late the weight of 100 grains steadily decreased as infestation levels from 0 to 50 aphids. In the Early Infestation, grain weight dropped moderately from 5.72 g at 0 aphids to 5.57 g at 50 aphids, showing a relatively lower reduction. In contrast, Mid Infestation results in a sharper decline, from 5.72 g to 4.79 g, indicating that aphid attacks during this period had a stronger negative impact on grain development. Late Infestation showed the most pronounced reduction, with weight decreasing from 5.72 g to just 4.54 g at the highest infestation level. These findings suggested that infestation timing significantly affects yield, with late-season infestations by *S. avenae* caused the greatest reduction in grain weight, likely due to direct damage during critical grain-filling stages. Those results wre similar to Oakley and Walters (1994), who mentioned that the economic threshold for direct feeding damage caused by cereal aphids varies depending on the crop growth stage. From growth stage (GS31) (beginning of stem elongation) to GS61 (beginning of flowering), control measures are recommended when 50% or more of the tillers are infested with cereal aphids. During the later growth stages, specifically from GS62 (flowering) up to approximately two weeks before the onset of grain filling, this threshold increases to 66% of tillers infested. These threshold levels reflect the crop's varying sensitivity to aphid feeding at different phenological stages, with earlier stages being more vulnerable to yield losses caused by aphid activity. Monitoring aphid populations during these critical periods is essential to ensure timely intervention and to prevent economic losses.

Table 4. Mean weight of 100 wheat grains infested with *Sitobion avenae* under varying levels of infestation in two successive seasons 2024/2025.

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
0	5.43	5.43	5.43	5.72	5.72	5.72
10	5.39	5.22	5.19	5.67	5.49	5.47
20	5.35	5.12	5.14	5.63	5.38	5.41
30	5.33	5.05	4.55	5.61	5.31	4.78
40	5.28	4.88	4.74	5.55	5.13	4.98
50	5.3	4.57	4.32	5.57	4.79	4.54

Results obtained in Table (5) presented that the percentage of weight loss in 100 wheat grains infested with *S. avenae* at varying infestation levels (0 to 50 aphids) and different infestation times (early, mid, and late) during the first season of 2023/2024. At all infestation levels, grain weight loss increased with higher aphid density, and the extent of loss was more severe with later infestation timings. For early infestation, the maximum weight loss was relatively low, reaching 2.54% at 50 aphids. In contrast, mid infestation led to a progressive increase in loss, peaking at 15.97%, and late infestation resulted in the greatest impact, with weight loss reaching 20.54% at 50 aphids.

The findings arranged in Table (5) showed the impact of aphid density and timing on wheat grain weight reduction. Across all infestation periods Early, Mid, and Late grain weight loss increased with higher aphid densities (from 0 to 50 aphids). Early infestation results in relatively minimal losses, rising gradually from 0.87% at 10 aphids to a maximum of 2.97% at 40 aphids, slightly decreasing to 2.62% at 50 aphids. In contrast, Mid infestation led to more pronounced losses, reaching 16.26% at 50 aphids, indicating that this period was more critical for aphid impact on grain development. Late infestation caused the highest weight loss, escalating sharply from 4.37% at 10 aphids to a peak of 20.63% at 50 aphids. These results clearly demonstrated that both infestation timing and intensity significantly influence yield loss, with late-season aphid attacks exerting the most severe effect on grain weight due to interference with grain filling during sensitive growth stages. These findings were agreed with Ghanim *et al.* (2018), who assessed yield losses in wheat caused by varying infestation levels of the aphid species *S. avenae*, one of the most abundant insect pests affecting wheat. The experiment involved introducing 1, 3, 5, and 7 aphids per spike to fifteen wheat tillers enclosed under cages during the flowering and heading stages. The corresponding yield losses observed were 28.66%, 47.35%, 61.77%, and 79.86%, respectively, indicating a clear positive correlation between aphid density and crop damage. Based on the 2017 market price of wheat (420 Egyptian Pounds per Ardab) and an estimated cost of control measures (90 EGP per feddan), the economic injury level (EIL) was calculated to be 7.03 aphids per spike per feddan. The economic threshold level (ETL)—the population density at which control measures should be implemented to prevent the population from reaching the EIL—was estimated at 2.26 aphids per spike per feddan.

Table 5. Percentages of weight loss on wheat grains infested with *Sitobion avenae* under varying levels of infestation in two successive seasons 2024/2025.

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
0	0	0	0	0	0	0
10	0.81	3.94	4.42	0.87	4.02	4.37
20	1.58	5.82	5.45	1.57	5.94	5.42
30	1.84	7.03	16.34	1.92	7.17	16.43
40	2.87	10.27	12.85	2.97	10.31	12.94
50	2.54	15.97	20.54	2.62	16.26	20.63

Table (6) showed that the economic injury level (EIL) and economic threshold (ET) of *S.avenae* across early, mid, and late infestation periods, using regression equations that relate aphid density to reductions in 100-grain weight. The regression slopes indicate that aphid damage is most severe during the mid infestation period, with the highest yield loss per aphid (15.394 kg/feddan), followed by early (9.925 kg) and late (6.480 kg) periods. As a result, the mid period had the lowest EIL (2.887 aphids/feddan) and ET (2.31 aphids/feddan), emphasized the critical need for early control during this stage to prevent economic loss. Conversely, late infestation resulted in a higher EIL (6.859) and ET (5.49), reflecting a lower economic impact per aphid. These findings support the significance of infestation timing in pest management strategies, with mid-season infestations requiring the most alert monitoring and rapid intervention.

Results in Table (6) presented data on the economic injury level (EIL) and economic threshold (ET) for *S. avenae* infestations during early, mid, and late growth stages in the 2024/2025 season. Regression equations indicated a linear relationship between aphid density and yield loss, with steeper slopes in the mid and late periods, signifying increased yield losses as the crop matures. Yield loss per aphid also increases substantially from early (2.32 kg) to late (16.23 kg) stages, reflecting heightened crop vulnerability. Correspondingly, the EIL and ET decrease across infestation periods, from 1.92 and 1.54 aphids in the early stage to 0.28 and 0.224 in the late stage, respectively, highlighting the need for earlier intervention as the crop progresses.

The linear regression analysis reveals that yield loss becomes more severe with increasing aphid density, particularly during the mid and late stages, as indicated by the steeper regression slopes. This trend underscores the crop's growing susceptibility to aphid damage over time. The marked increase in yield loss per aphid—from 2.32 kg in the early stage to 16.23 kg in the late stage—further emphasizes this vulnerability. Consequently, the corresponding reduction in EIL (from 1.92 to 0.28 aphids) and ET (from 1.54 to 0.224 aphids) across the growth stages highlights the critical importance of implementing control measures early in the season. Early intervention can prevent population buildup and avoid economic losses, supporting a proactive and stage-specific integrated pest management (IPM) strategy. Those results were in the same trend with Van Helden *et al.*, 2022 who assessed *D. noxia* infestation and its impact on crop yield under different conditions. It identified the percentage of tillers infested as the most accurate predictor of yield loss, estimating a 0.28% yield reduction for every 1% increase in infested tillers—lower than previous U.S. estimates, possibly due to varietal or environmental differences. Infestation typically peaked between growth stages GS40 and GS50. The study also calculated a daily post-GS30 increase in the percentage of tillers infested of 0.021%, aiding in forecasting yield losses and informing control timing. No clear thresholds were found for early growth stages (<GS30) due to the crop's ability to compensate with new tillers.

Table 6. Economic injury level and economic threshold in different infestation periods with *Sitobion avenae* in two successive seasons 2024/2025.

Infestation levels	2023/2024			2024/2025		
	Early	Mid	Late	Early	Mid	Late
Regression	Y = -0.01390*X + 5.479	Y = -0.02156*X + 5.433	Y = -0.01554*X + 5.433	Y = -0.003246*X + 5.705	Y = -0.01651*X + 5.717	Y = -0.02273*X + 5.718
Economic yield loss per aphid/kg	9.925	15.394	6.480	2.318	11.788	16.229
Economic injury level (EIL)/aphids	9.925	15.394	6.480	2.32	11.79	16.23
Economic threshold/aphids(ET)	4.478	2.887	6.859	1.92	0.38	0.28

In this study, mean annual data were employed in place of results from individual field experiments. This approach was adopted to minimize and stabilize variability in aphid populations and yield responses used in the regression analyses. Given that numerous environmental factors influence the economic threshold for pest damage, variability among fields is both expected and unavoidable. At the current stage of scientific understanding, it is not feasible to model this inter-field variability accurately; therefore, the use of average values is necessary. However, if the crop injury per aphid varies across years, the resulting correlations may be misleading. For example, Fereres *et al.* (1988) demonstrated that water stress exacerbates yield losses at a given aphid density, and other environmental stresses have similarly been shown to affect aphid abundance on winter wheat (Honek *et al.* , 2018). Laboratory studies on *Sitobion* spp. infesting wheat have similarly reported substantial yield reductions as aphid numbers increase from 5 to 15 (Thirakhupt and Araya, 1992). These findings highlight the complexity of determining economic injury levels, especially in high-yielding wheat cultivars known for their sensitivity to pest pressure (Mantel *et al.*, 1982).

At higher aphid densities, intraspecific competition leads to crowding and the formation of winged morphs, which are less damaging on a per-aphid basis. The proposed model bears strong resemblance to the density–yield relationships observed for whiteflies by Nava-Camberos *et al.* (2001), wherein yield loss per insect (in kg/ha) decreases in a nonlinear manner as pest density increases. Earlier models, in contrast, often relied on linear regressions. For instance, Entwistle and Dixon (1987) reviewed six such models and reported yield losses ranging from 1.4% to 4.4% at a peak density of 10 aphids per tiller, and from 5.7% to 15.6% at 40 aphids per tiller. In comparison, the present model predicts a 4.42% yield loss at 10 aphids per tiller and a 20.54% loss at 40 aphids per tiller.

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مستوى الضرر و الحد الاقتصادي الحرج للإصابة بحشرة المنّ الأخضر الحبوبي (*Schizaphis graminum* Rond.) ومنّ الشوفان (*Sitobion avenae* Fab.) على القمح في محافظة النجف، العراق.

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الملخص

يُعَدّ القمح (*Triticum aestivum L.*) من المحاصيل الحقلية الاساسية في العراق والعالم، إلا أن إنتاجيته تتعرض لتهديد كبير من حشرات المنّ ، وخاصة *Schizaphis graminum* ومنّ *Sitobion avenae* هدفت هذه الدراسة إلى تقدير مستوى الضرر الاقتصادي (EIL) والحد الاقتصادي الحرج (ET) لكلا النوعين خلال موسمين متتاليين (٢٠٢٣–٢٠٢٤ و٢٠٢٤–٢٠٢٥) في محافظة النجف، العراق. وقد شملت التجارب الحقلية إحداث عدوى صناعية في المراحل المبكرة والمتوسطة والمتأخرة من النمو، بكثافات منّ تراوحت بين ٠ و٥٠ فرداً للساق الواحد، وذلك تحت ظروف الأقفاص. تم تقييم وزن الحبوب وفقد الوزن لتحديد الضرر الناتج عن الآفة. أظهرت النتائج أن كثافة المنّ وتوقيت الإصابة كان لهما تأثير معنوي في تقليل الوزن، حيث سببت إصابات منتصف الموسم بـ *S. graminum* وإصابات نهاية الموسم بـ *S. avenae* أعلى الخسائر. في موسم ٢٠٢٣–٢٠٢٤ سُجّلت أدنى قيم الضرر الاقتصادي في إصابات منتصف الموسم لـ *S. graminum* (٤،٨٨٦ منّ/فدان) و *S. avenae* (٢،٨٨٧ منّ/فدان). أما في موسم ٢٠٢٤–٢٠٢٥، فقد ظهر أدنى EIL لـ *S. graminum* في إصابات منتصف الموسم (٠،٤٦ منّ/كج)، بينما سجلت *S. avenae* أدنى قيمة في الحد الاقتصادي الحرج نهاية الموسم (٠،٢٨ منّ/كغ). وتبرز هذه النتائج أهمية إدارة الآفات المتكاملة بحسب مرحلة النمو، مع إعطاء الأولوية لمكافحة المنّ خلال المراحل الأكثر حساسية من أجل تقليل الخسائر الاقتصادية، كما توفر هذه العتبات أساساً لتحسين قرارات المكافحة وتقليل الاستخدام غير الضروري للمبيدات.