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IMPORTANT FACTORS AFFECTING ON INFESTATION MAIZE EAR BY THE PINK CORN WORM *Pyrodeces simplex* (WLSM.) (LEPIDOPTERA: COSMOPTERYGIDAE). AT KAFR EL-SHEIKH REGION.

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ABSTRACT

Bink corn worm, *Pyroderces simplex* (Wlsm.) (= *gossypiella* Wlsm.) was attacked maize ear in the end season maize crop at the experimental Farm of Sakha Agric. Res. St., Egypt during the period 2004 and 2006. The eggs and larvae of *P. simplex* were found to be preying by one specie, *Blaptostethus picus* var *pallescens* Poppius. The peak of predator was recorded in the first week of September 2004was (178 individual/25ears) while the peak of this predator in the second season 2005 was (170 individual/25plants.

Full grown larvae feed on and bore into the dry kernels. Larvae may also feed between kernels rows. The mean numbers of larvae/25ear affected by different growth stages of maize ear and maize crosses.

The average numbers of the predator *B. picus* was 74.63 individual/100plants in the first season 2004. On the other hand the average numbers of the predator in the second season 2005 was 99.00 indivedual/100 plants.

The highest mean numbers of *P. simplex* larvae in different maize crosses were during the Physiological maturing stage and the lowest mean numbers during the Dough stage in the two successive seasons 2005 and 2006.

The highest mean numbers of *P. simplex* larvae were recorded in variety Bioner 3062 (4.03 larvae/ear) which uncovering with husks. On the other hand the variety SC10 was the lowest mean numbers of larvae (1.37 larvae/ear) which Cub husks tightly covering ear tip. The percentage of oil which obtained from Bioner 3062 recorded the highest percentage (6.81%) and attractive the highest mean numbers of larvae (4.03 larvae/25ears). On the other hand variety SC10 recorded the lowest percentage of oil (4.07%) and attractive the lowest mean numbers of larvae (1.37 larvae/25ear).

INTRODUCTION

Maize, *Zea maize* L. is one of important germanous crops for the human and the domestic animals in Egypt. Many insects infested this crop in the field during the different stages of the plant, causing serious injury in both yield and quality of the grain (Ba-Angood and Stewart, 1980). It has been known for many years that the maize pests in Egypt include the pink corn worm *Pyroderces simplex* (Wlsm.)(= *gossypiella* Wlsm.), which was recorded in Egypt by Willcocks (1916) to be found during autumn and winter in cotton bolls feeding during the larval stage on the seeds and fibers injured by the boll-worms (*Earias insulana* Boisd. and *Pectinophora gossypiella* Saund.). According to its apparent low economic importance, the attention of previous investigations was not drawn towards a detailed study on this species. In the present investigation, the larvae of *P. simplex*, which was thought a secondary pest only, were found causing a serious damage to the corn ears, Tawfik, and El-Sherif (1969).

The relative abundance of the larvae of *P. simplex* which attacking corn ears were recorded by Ragab (1988). Earliest infestation by *P. simplex* to maize plants is usually noticed at the first of August and the symptoms of attack and damage caused by its larvae to the corn ears, and caused much damage to the kernels. The eggs and larvae of *P. simplex* were found to be predator by only one species, *Blaptostethus picus pallescens* Poppius by Tawfik, and El-Sherif (1969), Ragab (1988) and Abd El-Gayed (1995). The larva of *P. simplex* has investigators of boring into the grain and during early stages it can subsist as a leaf, pollen grain or silks feeder Ragab (1988) at Mansoura district.

The objective of this study was to investigate the most important factors affecting on the infestation on maize ear by the pink corn worm *Pyroderces simplex* (Wlsm.) at Sakha, Kafr El-Sheikh Governorate

MATEREAL AND METHODS

This study was conducted at the experimental maize field at Sakha Agric. Res. St. Farm, during 2004-2006 seasons. Maize varieties were seeded on 1st June in 2004 and 2006. The experimental area was divided into 25 plots (5 varieties x 5 replicates) distributed in a CRBD. Every plot measured 6x7 m. (1/100 feddan) and consisted of ten rows 6m. Long and 70cm. apart. Distance between hills was 25cm. and stand was one plant/hill. Ear development stages were determined according to Bottrell (1979) as shown in Table (1). This area was planted with five varieties from maize crosses such as Such as (SC10, TC310, TC351, SG2 and Bioner3062) on 15th of May and 15th of July during 2005 & 2006. The area of plantation was divided into five equal plots of 12 x 15 meters each. The plot contained in hills spaced 25 cms., X 15 meters each.

Table (1): Growth stages of maize ear.

Stage number	Days after silking
5- Silks emerging & pollen shedding (66 days after emergence)	0
6- Blister stage.	12
7- Dough stage.	24
8- Beginning dent stage.	36
9- Fully dented kernels stage.	48
10- Physiologic maturing stage.	60

The plot contained in hills spaced 25 cms. On one side of the ridge. No chemical control has been practiced in the study area. When the ears started appearance and continued, twenty five corn ears were collected from five plots (five ears from each plot), at weekly intervals there after until harvest. The above mentioned scheme was taking in account in the present study, where seven days interval allowed taking one random sample representing each stage of corn ear. For surveying the *P. sample*x inhabiting corn ears and their associated predators, ears were sampled weekly for

laboratory examination. This procedure was carried out once the formation of the ears started (about 60 days after planting), and continued until harvest. The ears chosen for sampling were covered on standing plants, each by a plastic case kept in position by means of rubber band; these ears were detached from their plants for examination in the laboratory. Infested ears were examined thoroughly and dissected. The boring larvae were reared in the laboratory to obtain adults needed for identification. Specimens of insect pests and their predators were mounted either dry or on slides according to their size. Some specimens were preserved in 70% alcohol. Insect species collected from ears were classified according to their orders.

2-Determination of lipid content:-

Lipid analysis was carried out according to the method of I.U.P.A.C. (1987) for the successive seasons 2005 and 2006. A known weight of different samples (2gm) replicated two times, were extracted separately with petroleum ether 40% .The residue was dried to a constant weight at 115 C^o for four hours. The percentage of the lipid content was calculated by soxklet apparatus.

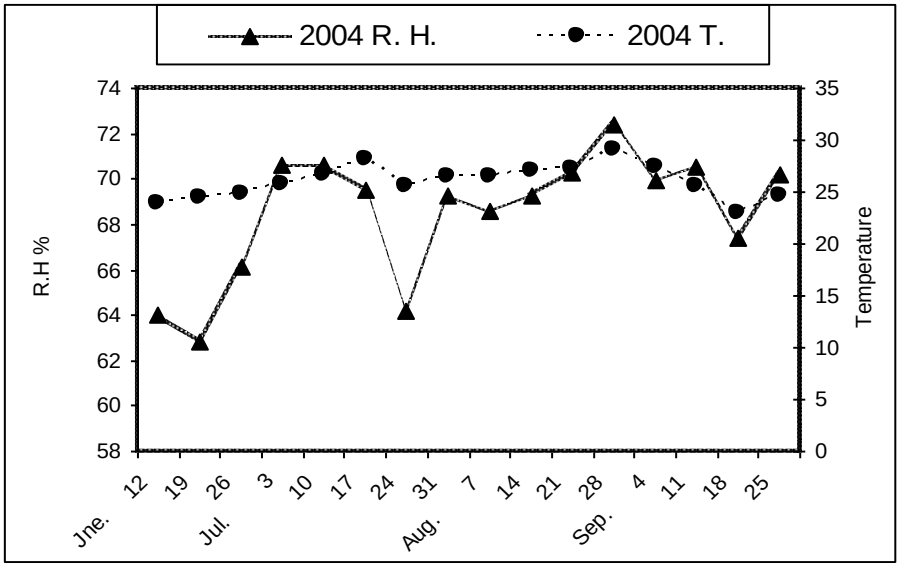
RESULTS AND DISCUSSION

1-Predator *Blaptostethus picus pallescens* Poppius:-

This predator appeared relatively in a few numbers during this study. As shown in Figs. (1 and 2) the predator increased gradually during progressive weeks of activity to arrive the respective peaks of 178 indiv./100 plants in the first week of September 2004 (at 27.5 ± 1.6C^o and 69.9 ± 1.9% R.H) and 170 indiv./100 plants in the last week of August 2005 (at 25.8 ± 0.9C^o and 73.5 ± 4.4% R.H), during the two seasons respectively. In synchronization between the peak of eggs or larvae of *P. simplex* and the peak of the predator *B. picus* during same periods approximately. On the other hand, during both years of study, activity periods of the pink corn worm and associated predators extended to about (6-7 weeks) from the second week of August until harvest during the two successive seasons 2004/2005.

As shown in Table (2), the average numbers of the predator *B. picus* was 74.63 individual/100plants in the first season 2004. On the other hand the average numbers of the predator in the second season 2005 was 99.00 indivedual/100 plants.

In this respect, Tawfik and El-sherif (1969), stated that the appearance of *P. simplex* and its predator *B. picus var pallescens* was associated with the development of corn ears. The predator appeared 1-2 weeks earlier than the pest, subsisting on other preys that might be available. The present investigation revealed that the larvae of *P. simplex* are frequently with anthocorid predator, *B. piceus*, an important role in reducing the population density of this pest. The predator was noticed for the first time on corn plants by Tawfik and El-Husseini (1971), who find the nymphs and adults of the predator wandering about between the ear envelopes and the kernels, searching for the larvae of *Pyroderces* to feed upon. Ragab (1988) and Abd El-gayed (1995).



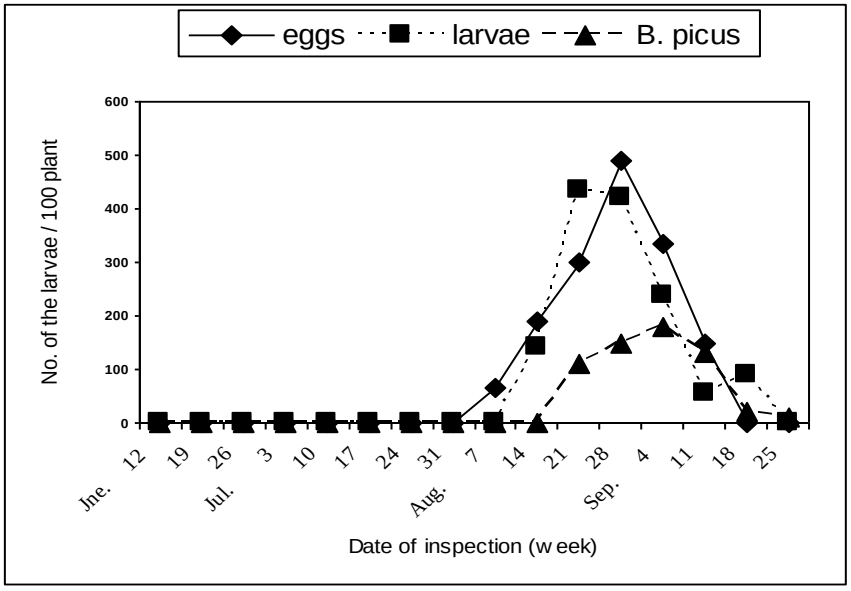


Fig. (1) Partial population curves of the immature stage of the Pink corn worm, *P. simplex* larvae and its predator on maize fields at Sakha during season 2004.

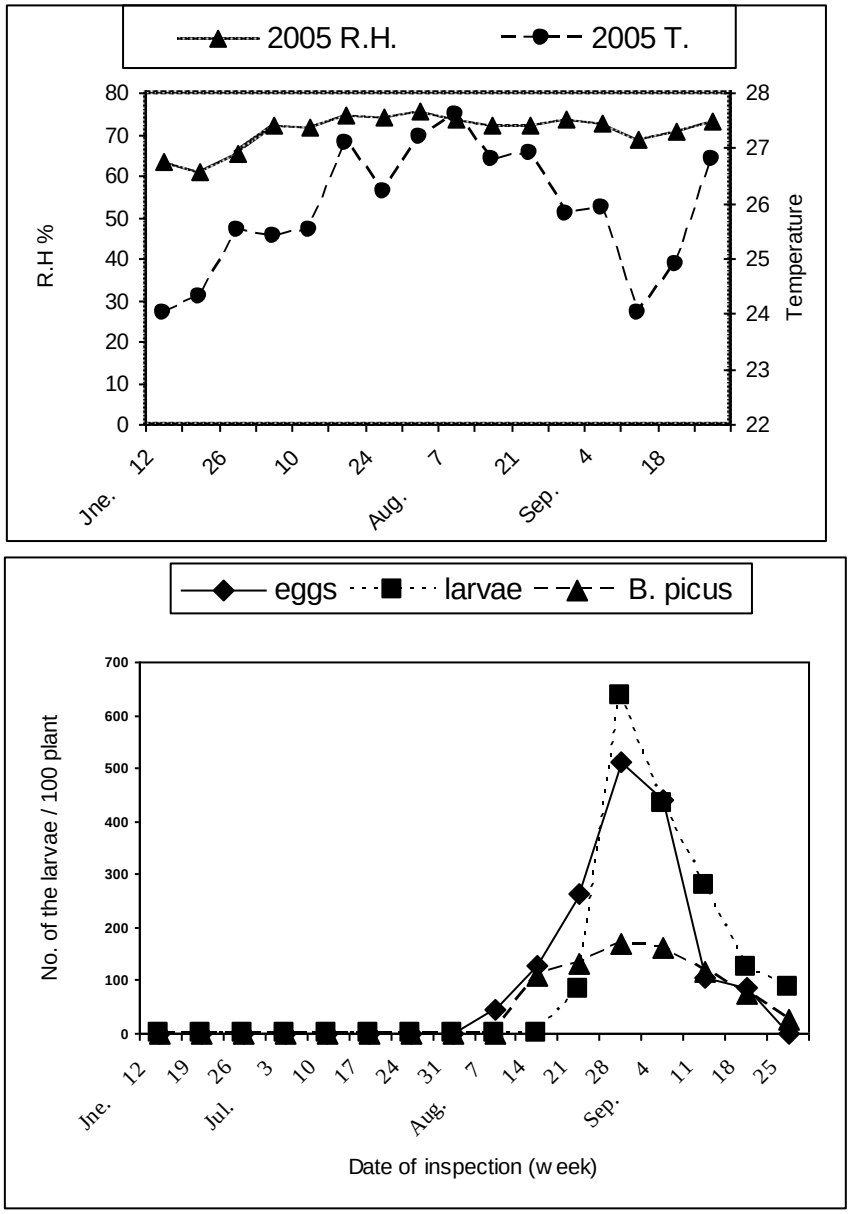


Fig. (2) Partial population curves of the immature stage of the Pink corn worm, *P. simplex* larvae and its predator on maize fields at Sakha during season 2005.

Table (2): Monthly average number of the immature stage (eggs and larvae) of the Pink corn worm, *P. simplex* and their predator of *B. picus* on maize field at Sakha during 2004 and 2005 seasons.

Data Sampling		2004			2005		
		P. simplex		*B. picus*	*P. simplex*		*B. picus*
		Eggs	Larvae		Eggs	Larvae	
Aug.	**7**	65	0	0	44	0	0
	14	190	141	0	128	0	110
	21	301	434	110	265	83	132
	28	489	419	150	513	635	170
Mean ± SE		261	248	65	237	180	103
Sep.	**4**	335	238	178	439	431	162
	11	147	56	130	106	279	115
	18	0	91	19	87	123	75
	25	0	0	10	0	88	28
Mean ± SD		120	96	84	158	230	95
Average		190.87	172.38	74.63	197.75	204.88	99.00

2- The growth stages of maize ear and different crosses:-

As shown in Tables (3 and 4) the highest mean numbers of *P. simplex* larvae in different maize crosses were during the Physiological maturing stage and the lowest mean numbers during the Dough stage in the two successive seasons 2005 and 2006.

Data represented in Tables (3 and 4) indicated that, during the Physiological maturing stage the variety Bioner3062 recorded the highest mean numbers of larvae (5.4 and 5.2 larvae/25ear) while the variety SC10 was the least mean numbers of larvae (2.6 and 3.0 larvae/25ear) during the two successive seasons 2005 and 2006 respectively.

Table (3): The average numbers of *P. simplex* larvae 25/ears at different growth stages of the three maize crosses of maize ear during season 2005.

Growth stages	Date of sampling	Three Maize Crosses				
		SC 10	TC310	TC 351	SG 2	Bioner 3062
		No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear
1-Silks emerging stage	July 31	0	0	0	0	0
2- Blaster stage	Aug.12	0	0	0	0	0
3- Dough stage	Aug. 24	0	0.3	0.5	0.9	1.0
4- Beginning dent stage	Sep. 6	1.7	2.1	2.4	2.7	3.1
5- Fully dent kernels stage	Sep. 18	2.0	2.7	2.8	3.0	3.6
6- Physiologic maturing stage	Sep. 30	2.6	3.2	3.7	4.6	5.4
Average	----------	1.0±1.1	1.4±1.3	1.5 ± 1.4	1.8 ± 1.7	2.2 ± 2.0

Table (4): The average numbers of *P. simplex* larvae 25/ears at different growth stages of the three maize crosses of maize ear during season 2006.

Growth stages	Date of sampling	Three Maize Crosses				
		SC 10	TC310	TC 351	SG 2	Bioner 3062
		No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear	No. of larvae/ ear
1-Silks emerging stage	July 31	0	0	0	0	0
2- Blaster stage	Aug.12	0	0	0	0	0
3- Dough stage	Aug. 24	0.5	1.0	0.9	1.3	1.6
4- Beginning dent stage	Sep. 6	1.9	2.6	2.5	3.4	4.1
5- Fully dent kernels stage	Sep. 18	2.3	3.1	2.9	3.8	4.4
6- Physiologic maturing stage	Sep. 30	3.0	4.3	3.9	4.9	5.2
Average	----------	1.3±1.2	1.8 ±1.6	1.6 ±1.4	2.2 ±1.9	2.5 ± 2.1

Pervious results agree with Ragab (1988) who mentioned that the larvae of *P. simplex* were more abundant on maize ears at El-Mansoura region during the physiologic maturing stage than the blister stage, and Ahmed (2001) recorded that the infestation with *P. simplex* ranged 0.15-7.1 and 0.36-8.58 larvae/ear during the beginning Dent and Fully dent kernel stages, during the physiologic stage. He mentioned that the infestation with *P. simplex* ranged between 0.15–7.13 and 0.36–8.58 larvae/ear during the beginning dent and fully dent kernel stage, respectively, then jumped to 0.53–9.31 larvae/ear during the physiological maturing stage.

3- The husk tightness around maize ear in different crosses:-

As shown in Table (5) the highest mean numbers of P. simplex larvae were recorded in variety Bioner 3062 (4.03 larvae/ear) which uncovering with husks. On the other hand the variety SC10 was the lowest mean numbers of larvae (1.37 larvae/ear) which Cub husks tightly covering ear tip.

Previous results go in line with the findings of Nyala-Osuna *et al*. (1983) who reported a significant negative correlation between the level of *Heliothis zea* damage and the closeness of husks over the tip of maize ear. In Brazil, Lara *et al*. (1985) further that certain maize cultivars were most resistant to *H. zea* because the husks of ear heads were very long. Also, Widstrom *et al* (1988) showed that resistance to *H. armigera* (Hb.) in maize hybrids was partially attributed to better husk coverage and tightness. Joyce and Davis (1995) contributed that the varieties of maize having ears with relatively longer silk channel length tended to have less damage of *O. nubilalis*. And also Ahmed (2001) observed that the least infestation was recorded on SC 122 (0.23-0.64 larvae/ear) and the highest infestation took place on SC 9 (0.38-2.36larvae/ear) whereas, infestation on TC310 was intermediate (0.05-1.7 larvae/ear).

Table (5): Effect of ear covering type on the mean numbers of larvae/25ears

Groups	Variety	No. of layers	No. larvae/ear	% infestation
A- Cub husks tightly covering ear tip	**SC 10**	6.06 ± 0.50	1.37	12
B- Cub husks loosely ear tip	**TC 310**	6.07 ± 0.41	2.89	28
	TC 351	6.93 ± 0.70	3.11	36
C- Ear head uncovering with husks	**SG 2**	7.10 ± 0.53	3.68	52
	Bioner 3062	6.00 ± 0.53	4.03	76

4- The percentage of oil in grain maize:-

Results in Table (6) showed that, the percentage of oil which obtained from Bioner 3062 recorded the highest percentage (6.81%) and attractive the highest mean numbers of larvae (4.03 larvae/25ears). On the other hand variety SC10 recorded the lowest percentage of oil (4.07%) and attractive the lowest mean numbers of larvae (1.37 larvae/25ear).

Table (6): Effect of oil percentage on the mean numbers of larvae/25 ears

Groups	Variety	% Oil	No. larvae/ear	% infestation
A- Cub husks tightly covering ear tip	**SC 10**	4.07	1.37	12
B- Cub husks loosely ear tip	**TC 310**	5.46	2.89	28
	TC 351	6.18	3.11	36
C- Ear head uncovering with husks	**SG2**	6.29	3.68	52
	Bioner 3062	6.81	4.03	76

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أهم العوامل المؤثرة على الاصابة بدودة كيزان الذرة القرنفلية بحقول الذرة بمنطقة كفر الشيخ.

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أجرى هذا البحث بمزرعة محطة البحوث الزراعية بسخا – كفر الشيخ وذلك لدراسة أهم العوامل التى تؤثر على الاصابة بدودة كيزان الذرة القرنفلية . المفترس المصاحب لها . وكذالك حساسية خمسة اصناف من الذرة وأيضا علاقة أحكام أو عدم أحكام الاغلفة المحاطة بالكوز وكذلك نسبة الذيت بالاصابة بهذة الافة خلال فترة الدراسة 2004 , 2006 .

أوضحت الدراسة أن أهم هذة العوامل هى :-

المفترس *Blaptostethus picus* var *pallescens* Poppius هو المفترس الوحيد الذى لة قدرة فائقة على البحث عن البيض والاعمار المبكرة ليرقات هذة الافة وذلك بين الحرائر والتغذية عليها وكان أقصى تعداد لة قد سجل خلال الاسبوع الاول من شهر سبتمبر لموسو 2004هو 178فرد/ 100 نبات بينما قد سجل اقصى تعداد لموسم 2005 هو 170 فرد/100 نبات خلال الاسبوع الاخير من شهر اغسطس.

تَغذّي اليرقاتُ الكاملةُ النمو بين صفوفِ الكيزان. وتختلف الاصابة باختلاف مراحل نمو الكيزان. وقد كانت الأعداد المتوسطة لهذا المفترسِ هى 74.63 فردَ /100 نباتات في الموسم الأولِ 2004. ومن الناحية الأخرى فكان متوسط أعدادة في الموسم الثانيِ 2005 هى 99.0 فردَ /100 نباتات.

واوضحت الدراسة ان اعلى متوسط ليرقات الذرة القرنفلية كانت موجودة أثناء مرحلةِ النُضُج الفسيولوجى للكيزان ، وايضا الأعدادِ المتوسطةِ كانت تظهر أثناء الطور العجينيِ خلال الموسمين .

وقد كان أعلى متوسط لاعداد هذة اليرقة سجلت على الصنف بايونير 3062 وذلك لعد احكام الاغلفة على الكوز. فقد سجلت 4.03 يرقة/25 كوز، وأوضحت الدراسة أيضا أن الصنف الهجين الفردى10 هو أقل الاصناف تعدادا لليرقات وذلك للاحكام الشديد على الكوز وكان متوسط اليرقات علية 1.37 يرقة/25 كوز.

كما اوضحت الدراسة ايضا ان الصنف بايونير3062 يحتوى على نسبة عالية من الزيت 6.81% ، وكان متوسط عدد اليرقات لة مرتفع عن غيرة من الهجن 4.03 يرقة /25 كوز. ومن الناحية الأخرى فقد وجد ان الهجين الفردى10 كانت نسبة الزيت بة قد سجلت اقل نسبة وهى 4.07 %، وعلية فان عدد اليرقات المتواجدة بالكوز اقل وقد سجلت 1.37 يرقة /25 كوز.ويتضح من ذلك أن هناك علاقة عكسية بين درجة الاحكام للكوز وعدد اليرقات الموجودة بة وعلاقة طردية بين نسبة الزيت وعدد اليرقات فى الكوز باختلاف الهجن.